

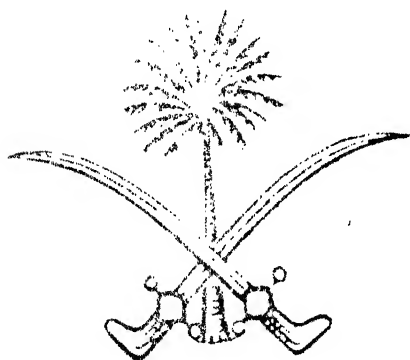
Saudi Arabia
With an Account of the Development
of Its Natural Resources

Saudi Arabia

With an Account of the Development
of Its Natural Resources

By K. S. Twitchell

WITH THE COLLABORATION OF
EDWARD J. JURJI



1947

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To the memory of

CHARLES R. CRANE

*the great American whose practical philanthropy
was the foundation of the present development of
the kingdom of his esteemed friend,*

King Abdul Aziz ibn-Saud

Preface

THE purpose of this book is to give the Western world some idea of the least known area in the Near East and of its ruler, King Abdul Aziz ibn-Saud. I should not have attempted to write it if I had not been urged to do so by Dr. Philip K. Hitti, Professor of Oriental Languages at Princeton University, and Datus C. Smith, Jr., director of Princeton University Press. Through a combination of circumstances which are explained in the section of the book dealing with Saudi Arabia's position in world economy, I have probably been longer and more closely associated with King ibn-Saud and his country than any other American. There is much of Saudi Arabia which has not previously been visited by non-Moslems, through which I was able to travel in connection with my work for the Saudi Arabian Government. These facts, considered in the light of the growing influence of Saudi Arabia and its King, seemed to make this endeavor worthwhile.

I wish to acknowledge the advice and assistance of Dr. Hitti and Mr. Smith, and that of Shukry E. Khoury and Farhat Ziadeh of the Princeton Department of Oriental Languages who helped me by drawing up a preliminary outline for the book. I am also indebted to my collaborator, Dr. Edward J. Jurji, Associate Professor of Islamic and Comparative Religion, Princeton Theological Seminary, and to Jean MacLachlan of Princeton University Press for editorial assistance.

I wish to thank J. G. Hamilton and A. L. Wathen for much information gained while I was on the U.S. Agricultural Mission to Saudi Arabia in 1942-1943, which was sponsored by the U.S. Department of State.

I wish to thank Col. Gerald de Gaury, M.C., for the use of

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information—on distances, in particular—from his *A Saudi Arabian Notebook*, Imprimerie Misr, Cairo, 1943.

I also thank Capt. H. C. Armstrong, author of *Lord of Arabia*, for much of my information concerning the early life of King Abdul Aziz ibn-Saud. In addition, I am grateful to H. E. Shaikh Hafiz Wahba, Minister of Saudi Arabia to Great Britain, for valuable data, and to Shaikh Khalil Rowaf and Mr. Shakir Dahir for their suggestions.

I also wish to express my appreciation to Ahmad Omar Fakhry, my companion, secretary and interpreter during most of my travels in Arabia.

Finally, I appreciate very much the assistance of my wife and of Mrs. Elizabeth Payne in checking material and giving me advice on its arrangement.

K. S. TWITCHELL

January 1946.

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I. Characteristic Features of Saudi Arabia

1. The Geographical Setting

SAUDI ARABIA comprises the bulk of the Arabian Peninsula. Extending northward on the map beyond the latitude of Alexandria, it reaches approximately that of Jerusalem. Iraq and Transjordan are its northern neighbors, whereas on the west its lands are adjacent to the Red Sea, Transjordan and the Gulf of Aqaba.* On its eastern frontier lie the Trucial Coast, Qatar, the Persian Gulf, Kuwait and Iraq. A delimited line in the south, surveyed and marked by the eminent British Arabist and explorer H. St. John B. Philby, separates the country from the Yaman. To the east of this border begins the Empty Quarter (*al-Rab' al-Khali*), a vast desert whose nomadic inhabitants, if they know any organized government at all, recognize the authority of ibn-Saud.

With regard to boundary lines, the following notes are reproduced from a statement kindly provided by His Excellency Shaikh Hafiz Wahba, Saudi Arabian Minister at the Court of St. James:

"The boundaries between Najd and Transjordan were settled according to the treaty of Hadda signed in 1925. As to those between the Hijaz and Transjordan, the negotiations were broken off because of disagreement over Aqaba and Maan. The British government considered these two regions part of Transjordan, whereas the Saudi Arabian government insisted that the two regions, until 1925, belonged to the Hijaz and that all their officials were appointed by King Husain. The question is still standing as it was before. As to the boundaries between Saudi Arabia and Qatar and Oman,

* For the convenience of the reader unfamiliar with Arabic, popular forms rather than the classical spelling of place-names have been used. A glossary of the classical equivalents of names which occur frequently will be found on p. 179-181.

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negotiations were taken up in the years 1934, 1935, and 1937, but the two parties arrived at no solution."

(1) *Hijaz* (boundary barrier), the first province of Saudi Arabia, consists primarily of a 700-mile-long coastal plain on the Red Sea reaching to the Gulf of Aqaba. Varying in width from 10 to 40 miles, this plain extends to a massive mountain wall of igneous and metamorphic rocks on its eastern edge which towers over 8,000 feet above the sea. The western slopes of this range are especially precipitous at the southern end, looking toward the province of Asir. South of the Mecca-Taif-Riyadh route no motor road traverses the mountainous region, though two roads are found in the north, one from Jidda to Mahad Dhahab Mine and the Najd plateau, the other connecting Jidda and Yenbo with Medina. The lowest pass traversed from the coast is 2,200 feet in elevation. Gradually the upland terrain slopes eastward towards the high tableland of Najd.

(2) *Asir* (difficult) is the name of the second province, lying to the south of the Hijaz and extending down to the approaches of the independent kingdom of the Yaman. Including a coastal plain (*Tihama*) along the Red Sea—200 miles in length and up to 40 miles wide—the area is densely populated in the river-flooded regions. In such localities as Raqaba, Gahama and Khor al-Birk, lava flows have reached the sea. And as in the Hijaz, the mountains on the eastern side of Tihama are extremely rugged, rising to an elevation of over 9,000 feet. There are not many trails in Asir, where even a donkey finds it hard to ascend the plateau, and the traveler is only too aware that "difficult" is the proper designation for the province. Gently sloping to the east, the mountains are usually terraced to prevent soil erosion and permit cultivation.

The Asir landscape is akin to certain parts of the Yaman in

GEOGRAPHICAL SETTING

the south, and to some regions in Cyprus and Italy. Its rainfall, exceeding the 4-inch average of most of Saudi Arabia, must attain, if one were to judge by the luxuriant vegetation, an annual 10 to 12 inches. This relatively high rate is confirmed, moreover, by the prevalence of a unique type of building at the capital, Abha, where the countryside of Asir begins to level off at 7,000 to 6,000 feet. Good-sized farming areas, parallel to the mountains, extend down the river valleys, reaching Najran and the Empty Quarter. The eastward inclination of the mountain slopes down to about 4,000 feet at Najran, and continues its descent until at Bisha, near the northeastern corner of Asir, it is 3,600 feet. At the edge of the great desert near Najran, an aneroid barometer indicates 3,500 feet.

(3) *Najd* (highland) is largely a sedimentary plateau, composed of limestones and sandstones, except for a band of igneous and metamorphics some 200 miles wide along its western side. It is bounded on the north by Iraq and Transjordan. There are hills rising a few hundred feet above the plateau. The original home of the present King of Saudi Arabia, and cradle of the *Ikhwan* (brethren)—the puritanical brotherhood of fundamentalist Islam—it contains the national capital, Riyadh, where the monarch spends much of his time. Mecca in the Hijaz is another political center whose fame, however, relates to its prestige as the foremost religious city in a Moslem world of about 300,000,000 souls. The power and magnitude of this world-wide Islamic community has not always adequately been understood in the West. Extending from the west coast of Africa as far eastward as the Philippines, and from Java in the East Indies archipelago, which is about ten degrees south of the equator, to the Caucasus and the Kirghis steppes, above 40° north latitude, this home of

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the Moslem faith occupies a very impressive part of the earth's surface.

Najd has been aptly described as the "heart of Arabia." Its cities of Buraida and Anaiza, and their environs, have reared many an official of the Saudi regime, governors (sing. *amir*) of towns and districts, members of the police force and the bulk of the standing army. The plateau slopes eastward to the Hasa—a province lying east of Dahna—and descends to an average elevation of 2,000 feet. Southward Najd merges into the Empty Quarter. As a province, Najd is furthermore distinguished today as the scene of a flourishing agricultural development whose nucleus is at Kharij, 54 miles south of Riyadh.

(4) *Hasa* (swampy, sandland) is the fourth province of Saudi Arabia, and stretches from the state line of Najd, which is along Dahna, to the Persian Gulf. It meets the Empty Quarter in the south, and in the north borders Kuwait and the Neutral Zones. Geologically, it is formed of sedimentary rocks. Since 1934 one major oil field has been developed at Dhahran and others are indicated at Abqaiq and abu-Hadriya. Yet even prior to the discovery of oil in this province it had already ranked as an important asset to Saudi Arabia, largely through the celebrated Hofuf oasis with its seven enormous water springs, of which the largest discharges 22,500 gallons of water per minute; and its more than two million palm trees which produce the highly prized *khillas* dates. The oil company equipment as well as petroleum produced here go through the ports of al-Khobar and Ras Tanura, joined with the Dhahran oil field by pipelines. Formerly, however, the trade of Najd passed through the ports of Oqair, Qatif and Jubail.

It was a fortunate day for the whole country, with its four provinces, when according to a royal decree promulgated in

GEOGRAPHICAL SETTING

1932, it came to be known as "Saudi Arabia" instead of "Najd and Its Dependencies." The new name bore witness to the constitutive role of the Royal House of Saud, a ruling family like the Tudors and Stuarts of British history. As ranking member of his clan, and chief architect of the new state, King Abdul Aziz ibn-Saud has been remarkably successful in consolidating the tribes and provinces under one sovereign and independent government.

2. Geology, Topography and Climate

GEOLOGY

IT is a source of immense economic advantage to Saudi Arabia that two-thirds of its eastern structure comprises what is normally known to geologists as a sedimentary formation—a variety of rock which under certain conditions becomes an ideal home for oil and coal deposits. These sedimentary formations are principally limestones, although at al-Ula, along the northwestern edge of the country, sandstone abounds in massive beds. The remaining western area, extending as far as the Red Sea, with the exception of sedimentary relics in the vicinity of the Farasan Islands, Jizan and Sabiya in the south, and Umluj, Dabba and Muwailih near the head of the Gulf of Aqaba, consists of igneous and metamorphic formations, favorable to metallic mineral deposits. A few metallic minerals are found in both kinds of formation but, with the exception of salt, lime and gypsum, they are of little immediate benefit to the country. The sedimentary formations are, of course, the source of the important oil field developed at Jabal Dhahran in the Hasa, and of the newer fields at abu-Hadriya and Abqaiq. It is not at all unlikely that other commercial oil deposits may yet be discovered in this concession area of about 500,000 square miles.

Sandstone outcrops occur also farther south in Asir. South of the town of Khamaseen in Wadi Dawasir, at an elevation of 2,200 feet, a low mountain range projecting in a north to south direction seems to be entirely of coarse-grained aeolian sandstone, with large quartz pebble inclusions and sufficient iron oxides to give it a deep red color. Fragments appear in the form of slabs which resound when struck, with the bell-like ring of a phonolite. Fantastic shapes, caused by erosion of wind and sand, fill the mountain ridges. Nevertheless, lime-

GEOLOGY, TOPOGRAPHY, CLIMATE

stone fragments are found 58 miles south of Khamaseen, in the ancient Himyar ruins of Qarya in the Empty Quarter, where old wells of an estimated depth of 90 feet were apparently constructed of limestone, indicating that the sandstone layer was not very thick.

A distance of 133 miles separates Khamaseen from the next watering place, Bir Himaa, standing 4,000 feet above the sea, on the western edge of the Empty Quarter. These wells are in a basin consisting entirely of red aeolian sandstone. Another 35 miles southwest is Bir Husainiya and its 129-foot-deep well where granite holds absolute sway, with several igneous flows in evidence, and the most recent pink (feldspar) granite enclosing fragments of the gray granite. From thence to Najran, all the country rock is definitely granite. The headquarters residence and office of the governor, Amir Turki ibn-Mathdi, are situated near the head of the Najran valley, encircled, save on the east, by mountains. Those to the south and west are capped with sandstone, rising more than 1,500 feet high above the valley floor, itself 4,000 feet high. These sandstones and sediments extend to and through an extensive section of the mountains of the Yaman.

The western area, already referred to, extending from the Red Sea eastward to the points of contact with sedimentaries, is composed largely of igneous and volcanic rocks, many of which have undergone a great transformation—that is, have been “metamorphosed”—by tremendous torsion and twisting, caused by the formation of the great mountain range, a thousand miles long, which rises in a line parallel to the Red Sea. In Saudi Arabia, its peaks soar to a maximum height of over 9,000 feet, and to 11,000 in the Yaman. Scattered along the plateau east of the mountain summits are numerous geologically recent volcanic cones and lava flows. A tongue of lava may be observed east of Abu-Arish close to the frontiers of

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the Yaman; while in several other spots, between Shuqaiq and Khor al-Birk, the lava reaches out into the Red Sea. Then at Gahama, to the north of Shuqaiq, there is a volcanic cone which forms an island a short distance offshore.

Some 12 miles from Mecca, at Jabal Nura, there is an excellent quality of burned lime, obtained from sedimentary fragments which have been metamorphosed. Similar "islands" are to be seen on the road from Jidda to Mahad Dhahab, about 40 miles beyond Jidda, as well as at Gharine Abyad—or "White Goat's Horn"—approximately 100 miles from Jidda. Similar occurrences, though considerably smaller, have been noted in Najd 100 miles farther due east. At Mahad Dhahab Mine, the mine hill itself is a felsite and highly metamorphosed sedimentary overlain by a basaltic flow. The mine mountain is andesitic, cut by quartz veins and partly overlain by a rhyolite flow. Most of the exposures to the east of the volcanic and metamorphic mountain are granite. At Taif, the granite shows many intrusive dikes to the west as the mountains become higher. Close to the southern end of this massive mountain range—in the Yaman—there are stratified deposits of volcanic ash, or "tuff."

TOPOGRAPHY

In order to visualize the general topography of Saudi Arabia one must again recall the coastal plain fringe along the Red Sea; then, the steep mountain wall rising to over 9,000 feet at the southern end of Asir, 8,000 feet behind Mecca, 4,000 west of Mahad Dhahab, 3,000 near Medina, and continuing northerly at about this same elevation, with Wadi Hamdh and other valleys cutting through at 2,000 feet. To the east of this mountain wall is the great Najd plateau, varying from 6,000 feet to 4,000 feet between Asir and Taif, thence descending to 2,200 at al-Ula. This whole tableland slopes

GEOLOGY, TOPOGRAPHY, CLIMATE

gently eastward to the Persian Gulf. Granite hills lift their heads above the plateau in the western third, and the Tuwaik mountains, the Awanid Scarp and the Kharj rise, to the north and south of Riyadh, above the general level. Lengthy folds and faults also appear along the Dahna, and there are many erosion-formed hills in the Hasa.

On the west side of the mountain range is the great coastal plain, known as Tihama, bordering the Red Sea. Its width, as we have seen, varies from 40 miles, at Hodeida in the Yaman, to an approximate average of 30 miles from Jizan northerly to Lith, then 10 to 20 about Wejh, and finally it shrinks to nothing at the Gulf of Aqaba. The mountain wall, behind this coastal plain, is dotted throughout with foothills, and there are great valleys (*wadis*) reaching far to the east, the largest of which is Wadi Hamdh, south of Wejh. One terminus of this valley comes close to Medina, while the other branch reaches the vicinity of al-Ula. Other important valleys are the Wadi Yenbo, Wadi Rabigh, Wadi Ghoran, Wadi Fatimah; and in Asir, Wadi Itwad and Wadi Bisha. They carry large amounts of water and, at times, vast quantities of silt also. The scarcity of vegetation on most of the mountain slopes that form the drainage basin of these valleys results in an almost 100 per cent run-off. The deposit of silt, on the other hand, forms many fertile arable lands in places where the river beds are nearly level, on the backwash of river bends, at the emergence of streams from the mountain walls and at the confluence of the rivers with the sea.

On the east side of the mountain wall, the slopes are much less precipitous, graduating to the great inland plateau which lies nearly within the confines of the Najd province. At Asir in the south, the eastern mountain slopes are well terraced for cultivation. They reach the more level areas at elevations of from 6,000 to 7,000 feet. The general inclination is east by

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north until the edge of the Empty Quarter is reached. The immense Najd plains extend 900 miles to the north through Hail to the Iraq-Transjordan frontier. The following elevations of points I visited will confirm the statement that the Najd plains are fairly level. They will also make it clear that along the eastern side of the Hijaz mountain range, the terrain slopes gently to the north. The level areas at Taif average 5,000 feet above the sea; at Ashaira 3,700; at Birka 2,800; at Hafira, on the old Hijaz Railway, 1,740. Sixty-six miles to the north, along the railway line, at the old Turkish pilgrim fortress called Qalat al-Sura, the elevation is 2,200 feet. This fortress lies at the junction of the motor route leading to Khaibar, 104 miles southeast, which also has an elevation of 2,200 feet.

For the points lying on a line north from Sulaiyil, at the northern edge of the Empty Quarter, the following elevations have been recorded by an aneroid barometer:

	FEET		FEET
Sulaiyil	2,210	Anaiza	1,910
Laila in Aflaj	1,700	al-Rass	2,000
al-Kharj	1,360	Fawara	2,350
Badia Palace at Riyadh	1,800	Samira	2,700
Bir Rumah	1,760	Hail	2,800
Marrat	2,190	Faid	2,550
Buraida	1,820		

There are hills protruding through these huge plains and long cliffs, 100 to 200 feet high, are formed by the fault scarps running in a general north-south direction near the Awanid mountains and also between Riyadh and Kharj. The Tuwaik mountains are in a similar parallel line but to the west of Kharj and Aflaj.

Another topographical phenomenon is the Nafud, the land of sand dunes. The Great Nafud or "Nafud Dahi" extends north from the immense desert of the Empty Quarter up to

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Jauf near latitude 30° North, where it merges with the Dahna. The width varies from 100 miles, west of Sulaiyil, to 25 miles near Marrat, and similarly near Anaiza and Buraida; then north and northwest of Hail it terminates in a great waste, 250 miles long. The greatest width is roughly 170 miles, lying south of Jauf. Its length from Sulaiyil at the northern edge of the Empty Quarter is about 800 miles. In the Nafud there are numerous great parallel ridges of sand interspersed with wind-swept exposures of the underlying rock—generally flat beds of limestone. The dunes are like a sea and show the direction of the prevailing winds by huge crests and combs of sand, like breakers. These crests may reach a height of 100 feet but are usually 20 or 30 feet high. In many instances there are long gradual slopes like swells on the ocean and along these are cross ripples which, incidentally, are extremely hard on car springs.

The Dahna is a great ribbon of folds and faults, 25 to 60 miles wide, in the limestone which starts southeasterly from the Iraq border down to the Empty Quarter, forming a crescentlike figure. The general elevation is 1,200 feet at Maagala, on the eastern side of the Dahna, and 1,700 feet at Bir Rumah on the western side. From the eastern side of the Dahna the ground slopes gradually to sea level along the Persian Gulf. There are many slight faults and folds in this huge area, including the domes suitable for oil accumulation which geologists of the Arabian American Oil Company have discovered, worked out and, in at least three places, developed.

Conspicuous in this great easterly sloping sedimentary area are many "islands" of limestone, capped with segregations of ferruginous chert or chert sediments. In many instances the underlying softer beds are eroded, leaving an overhanging yellowish brown "roof." I dubbed this the "thatched roof

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formation," and found they make excellent landmarks in a region where milestones are few.

Along the shore of the Persian Gulf as well as inland there are level plains, known as *sabkḥahs* (mud flats), varying from a half mile to 15 or more in length. Their crust varies in thickness from a few inches to eighteen. In most places they will support cars and trucks, but travelers never forget the troubles entailed when motor transport breaks through this crust. The deeper the wheel sinks, the more liquid the bottom. A broad-bearing surface of brush, mats, corrugated iron and boards to sustain high lift jacks, is the general method of moving a stranded vehicle, if a truck to tow the victim is not available. For hundreds of miles parallel to the coast lie a band of sand dunes, similar to those of the Nafud, varying in width up to more than 40 miles. In most places light cars with low-pressure 9" x 13" tires, light trucks with 10.5" x 16", and heavy trucks with 12" x 24", can traverse the sands.

CLIMATE

In a vast country such as Saudi Arabia, with many fluctuations in elevation, wide divergence in climate is to be expected. In the Hijaz and Asir, the summer climate along the seacoast is hot and damp. The temperatures are seldom above 100° F. but the humidity is usually over 85 per cent, which, accompanying temperatures of 99° F., creates a mist like a Turkish bath. At Jidda during a sandstorm the mercury may cling to 119° F. The air then becomes so dry and heavy-laden with sand that visibility is but a few feet. On board ship in the Red Sea, during such a storm, poor visibility makes the use of the foghorn necessary. The lowest temperature I recorded at Jidda was 54° F. Generally a northwesterly breeze makes the summer weather bearable and the winter delightful. When the wind turns southerly, heat, humidity and storms are

GEOLOGY, TOPOGRAPHY, CLIMATE

likely. From October to May is the "rainy season," with the promise of an occasional shower.

At a distance of five miles inshore the humidity is low, and it is generally less inside the line of foothills. As altitude is gained in climbing the Hijaz and Asir mountains, the air is still drier and more bracing. Along the southern end of the range, in Asir and southern Hijaz, the higher mountain slopes tend to condense the moisture. They also receive the influence of the monsoon, and rainfall attains its peak of 12 inches, according to an estimate based on topography and vegetation, made in November 1942 by J. G. Hamilton, a U.S. Department of Agriculture agronomist, and A. L. Wathen, Chief Engineer, Indian Office, U.S. Department of the Interior. That the rainfall is much heavier than farther east is demonstrated by the fact that the mud walls of buildings here are protected by multiple eaves of schist slabs.

In the highlands the temperature varies from 115° F. in the summer to occasionally freezing weather in the winter where the elevation is 5,000 feet or more. The nights are comparatively cool throughout. In all the Najd tableland uniform climate prevails. The nights are comfortable, even during the summer season, in the Nafud, Dahna and the Empty Quarter. They come as a welcome relief from the withering furnace heat which begins within one or two hours after sunrise and lasts till sunset. In the U.S. Agricultural Mission camp at Laila in Aflaj, Najd, we rested during midday, taking turns pouring glasses of water over ourselves and our cots, to draw some coolness from the rapid evaporation.

The great Hofuf oasis in the Hasa has a somewhat humid climate in summer, but its winter weather is crisp and invigorating. The surrounding sands tend to reduce the humidity, although at an average elevation of 680 feet on July 2, 1942, during the U.S. Agricultural Mission trip, a temperature dry

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bulb registered 114° F., the wet 72° F. determining a humidity of 11 per cent. Along the Persian Gulf coast, the spring, summer and autumn climate is hot and damp, and on Bahrain Island, 22 miles off the Saudi Arabian shore, the humidity is even higher. No rainfall records have been made in Saudi Arabia save those of the British Legation and the oil and mining companies. Basing judgments on these available findings, supplemented by those of H. St. John B. Philby and my own, it would seem clear that the average annual rainfall is 3.5 to 4.5 inches, except in the Asir mountains and southern Hijaz, where, as previously noted, it fluctuates between 10 and 12 inches. The average precipitation of about 4 inches may fall in three or four showers, mostly in December, although at Mahad Dhahab Mine the heaviest rain I witnessed fell on May 11, 1935.

3. Agricultural and Pastoral Wealth

AGRICULTURE

BESIDES the forest products of charcoal in northern Hijaz, and the poles and timber of Najd in the Buraida district, and of the Hijaz in Jabal Kura, west of Taif, there are in Saudi Arabia a number of important agricultural crops, including dates, sorghums, wheat and rice.

The major agricultural product of the country is the date, of which there is an unnumbered variety. In the western regions, the finest types are produced in the neighborhood of Medina. Fifteen kinds were sent me from this area, and there are probably several more. Yenbo is a date-exporting center, and almost every village in the Hijaz below an elevation of 4,500 feet raises this staple food. In Asir, the district of Bisha is famous for its dates, exporting quantities of them to many sections of the province, including the seacoast. The Kharj district of Najd is noted for its dates, but the variety sent abroad consists of the small, sweet and highly prized ones called *al-khilas*, produced in the renowned Hofuf oasis of Hasa. Mercantile firms engaged in date exportation have been established in Bahrain, where the Qusaibi brothers and the Ajaji are the leading Saudi Arabian concerns.

The grain sorghums, of which five different varieties, three white and two brown, deserve notice, rank with the date crop in importance. As these sorghums require about 180 days to mature, the U.S. Agricultural Mission recommended the testing of American types requiring but 95 to 115 days to ripen. Millet is a general name for seeded sorghums, and the valuable grain is grown in nearly every place I visited, most districts raising one type of white sorghum and one of brown or red. There are stunted types grown in the sands, with small heads and stalks only three feet high. In the Tihama flood

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plains of Asir and southern Hijaz the sorghums have much larger heads and stalks reaching up to 17.7 feet. Great areas in all the 300 miles of Tihama, southward from Lith, produce this grain as its principal and in places its only crop. In northern Hijaz, and on through the Najd and Hasa oases, sorghums constitute part of the home-grown food. At times some of the Tihama grain has been exported, usually to the Sudan. To an extremely limited extent, maize—that is, American corn—is produced, but the climate, soil and market favor a considerable increase.

Wheat was formerly the staple article of diet, after dates, but some years ago enterprising merchants imported rice in quantities and at a price which induced practically the entire population to substitute it for wheat. The curtailment of shipping during World War II brought about a return to wheat. In many parts of the country the planting of wheat was therefore reintroduced, yielding substantially in 1944 and 1945. In 1942 many hundreds of tons of it had been produced at Kharj, and, 28 miles southeast, at Khafs Daghara. There are innumerable small plots raising wheat but, aside from the Kharj and its vicinity, the largest amounts are grown on the terraced mountain slopes of Asir, in the eastern highlands towards Najran and in those plantations of the north towards Taif.

Rice figures as an important product in the great Hofuf oasis of the Hasa. The large volume of water flowing from the seven huge springs in this spot make possible the necessary flooding of rice fields. Most of the rice paddies lie in the date groves, and the entire crop is consumed locally. While the red variety of rice now prevails, tests with the higher-priced white grain are under way.

Minor agricultural products consist of a small and excellent supply of coffee from Asir, of the same Mocha variety for

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which the Yaman is justly famous. Among the fruits raised are bananas, apricots, pomegranates, figs, peaches, citrons, oranges, limes, prickly pears, pears, quinces, melons, papayas, crab apples and grapes. Of vegetables the best known are potatoes, eggplant, okra, squash, radishes, onions, tomatoes and beans. *Hiwar* is a plant raised here and in the Yaman, yielding the indigo dye which is made at Baish and other Tihama towns. Almonds are produced in small quantities, also peanuts. The most important crop furnishing livestock feed is alfalfa. It is also employed in the making of a green stain for interior house decoration in Asir. The growing of cotton remains in the experimental stage at present.

LIVESTOCK

A greater source of wealth, surpassing even dates in value, is livestock. In order of usefulness the principal kinds of livestock are camels, sheep, goats, cows, donkeys, poultry and horses.

The camel is the most important animal in Saudi Arabia, an indispensable part of every Bedouin family, whose status of wealth is commonly reckoned by the number of camels it owns. It provides the nomad with milk, meat and transportation. A camel laden on one side with a portable wood and skin watering trough, balanced by a child and great black cooking pots on the other, is a sight frequently encountered in an Arab country. Another is a tiny tot, perched on a tall beast plodding up and down an inclined plane, hauling up skin or leather buckets of water from the desert well. Indeed, much of the nomad's entire existence is devoted, with the aid of the camel, to procuring water. As a means of transport the camel is absolutely essential in pursuing the rains and fresh grazing areas. After the winter rains, the herds of camels, sheep and goats are said to go for two or three months with-

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out visiting wells, getting their moisture in the meantime from shallow rain-water pools and cisterns, and from the heavy dews which lie on the grass and bushes during this part of the year.

Formerly there was a large export of camels to Africa, Egypt, Syria and Iraq, but the advent of the automobile has put an end to this trade. Nevertheless, camels will always be essential to the economy of Saudi Arabia. Motor transport is bound to increase, and may even become universal for long-distance carriage, yet it is doubtful whether it will ever be as cheap per ton-mile. Where the time element is not a factor, the companies operating in Saudi Arabia will undoubtedly use the maximum camel transport, since it contributes to the welfare of many people.

All camels in the land are of the single hump or dromedary type. Sheep furnish the greater part of the meat diet, goats supplement the camel milk, and only a few young camels are slaughtered for use as meat. Camel's hair is used but little, though the finest Arab gowns (sing. *mashlah*) are made from camel's hair and wool.

Sheep rank next to camels in importance, and are in considerably larger numbers, providing at present the bulk of the meat consumption. Invariably the Arab feast or banquet consists of a roasted sheep, cooked whole in a large pot and served, surrounded by boiled rice, on a great circular tray which is placed on a woven mat or black oilcloth. At Mecca, during the pilgrimage, each adult male is supposed to sacrifice at least one sheep. Thousands are thus consumed annually.

The Saudi Arabian varieties of sheep are peculiarly adapted to the semiaridity of the country. Sheep's milk is extensively used and a considerable amount of excellent cheese is made from it. All Arab sheep have fat, broad tails in which nourishment is stored as in the camel's hump. The fat from the

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tails constitutes an appreciable item of domestic commerce, as well as small export to Egypt. It is heated to form a kind of butter, corresponding to lard, known as ghee or *samn*, universally used in cooking, and quite palatable until it becomes rancid. As there are several million sheep raised in the country, the possibilities for a profitable development of a ghee industry are definitely in sight.

Of the several varieties of sheep, those with the best wool are largely from the Hasa, and, to a lesser degree, from Najd. A small fraction of the wool is sheared and woven into gowns, or the sleeveless, knee-length, heavy winter overcoats called *beedis*, for use in the highlands of Taif and Asir. Due to the natural oil in the wool, *beedis* shed water well for some time, but when thoroughly soaked after a day's rain, like a heavy sponge they become a burdensome load. Arabian wool is of the coarse type known as "carpet wool," used in carpet weaving. America imports this kind of wool from India and China, and there is an opportunity here for Saudi Arabia also to develop an export trade in this product. Very few sheepskins are exported as they are generally considered of poor quality. If the black-headed Somali sheep were to be introduced, further considerable export might be envisaged. Its skin is of a quality desired by American glove and pocket-book manufacturers.

Goats are third on the livestock list. With camels, they furnish most of the milk consumed. Milk with rice and dates, as well as occasional mutton, constitute the standard Saudi Arabian diet. Goats, which thrive where sheep become emaciated, furnish the hair for the famous "black tents of Arabia." This hair varies in length, some coats being too short to shear. Since the vitality of one animal cannot produce at once the maximum of milk and hair, by selective breeding one type of goat could be produced to give maximum milk,

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and another superior length and amount of hair. Mixed with wool, goat's hair is also used for making rugs and carpets. The angora type of goat, used for producing mohair, probably is not hardy enough to endure the Arabian heat, though it may thrive in the heights of the Hijaz and Asir, where it could be tested at Taif and Abha. Some goat and sheep skins serve as overcoats in the highland zone where *beedis* are too warm.

Dairy cows at Jidda supply the needs of about fifty American and European residents. In other larger towns, though sufficient feed is available, very few herds are to be found. The only cattle range I saw was in the Hummaya district of southwestern Asir, close to the Yaman frontier. With an ample market for cattle products in Egypt, as well as in Jidda, Mecca, Riyadh, the oil camp in Dhahran and the mining camp at Mahad Dhahab, cattle raising could become a profitable occupation, although at present transport considerations are prohibitive. With a good road from Jizan to Jidda, and shipping facilities at these two centers and at Suez, a lively cattle industry could be established, somewhat circumscribed, no doubt, by the limited range.

Up and down the land, donkeys are the ever-faithful, generally overloaded beasts of burden. The Hasa produces a large donkey type, 10 to 13 hands tall, almost invariably pure white. A fast walker, this animal is used extensively in raising irrigation water by the hoisting of skin buckets from wells. A cross between this donkey and a strong Arab mare should produce an excellent mule to aid the development of local agriculture, and mules might in due course become an article of export. It is possible, though, that the affection and high esteem in which the horse is held by the Arabs might militate against any such cross-breeding. This breed of unusual donkey should also be perpetuated by mating only the

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best jackasses with good female donkeys. The castration of poor jacks would eliminate in the end the breed of small, weak, mouse-colored donkeys, of which at present there is an abundant number. An animal of inferior quality consumes almost the same amount of water and feed as a first class one but yields infinitely less profitable service.

Najd has long been famed for its strain of Arab horses, but the outstanding ones, as in Europe and America, must be picked with painstaking care. The Arab horse is an extremely gentle and sensitive mount, quick on the start and of remarkable stamina. In my experience it is careless when traveling over smooth ground, often stumbling, but on a stony, strenuous terrain it is amazingly quick and sure-footed. Horses raised in the desert are usually nervous on mountain trails. The typical Arab horse has a beautiful, intelligent head with small ears, a thick neck, well-rounded hindquarters, is close coupled, carries the tail well out away from the rear, has clean, slender limbs and small feet. It is usually shod only forward, if at all. In Saudi Arabia the horse is primarily a luxury, used only for riding. It is treated as a pet, being almost a member of the family. In Jidda there are perhaps half a dozen horses employed for hauling carts from the customs quay to the various stores, but they are not used in plowing or the hoisting of well water.

The crossing of an Arab thoroughbred with the Australian "whaler" is said to produce the most excellent polo ponies. One of the finest Arab stables in the world is maintained at Bathim, near Cairo, by the Royal Agricultural Society of Egypt under the able guidance of Fuad Abaza Pasha, director of the society. Selected Arab mares and studs are brought together here to perpetuate the best strains. Another stable of Arab horses is connected with the Kellogg Farm of the Uni-

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versity of California, where crossing of the Arab horse with other breeds is investigated.

The King, his sons and most of the prominent Saudi Arabians enjoy riding, racing and attending races. The races at Riyadh, Taif and other centers, in which the princes sometimes take part, attract considerable popular attention. At Yamama, near Kharj, ibn-Saud has a large stable, and Abdullah ibn-Julwi, Governor of the Hasa, has another at Hofuf.

4. Minor Economic Resources

FISHING

ALONG the Red Sea and Persian Gulf coasts of Saudi Arabia there are many men employed in fishing. The seaports are supplied with fresh fish by fishermen who go out in *sanbüks*, dhows and "khouries" or dugouts, shaped like canoes. Some fishing is done with circular nets near shore in shallow water where the fisherman wades out to his waist to make the cast. Only small fish are obtained in this way, to be used as bait for the deep-water fishing in which hooks and hand lines are utilized. A unique method of baiting is commonly practiced, consisting in laying the hook with a handful of minnows between two stones of fist size, making a sort of sandwich. This sandwich is held firm by looping the fishline around the two stones in a bow half-hitch. With the stones acting as a sinker, the line is lowered to the desired depth, then given a sharp jerk which unties the stones and releases the minnows. They float around and reach the surface, whereas the hook, encased in a large minnow, stays down and catches the greedy fish which is after the largest meal.

The Arab who takes one out to fish generally knows the home of the different varieties. He will say, "At thirty fathoms we will get a *sultana*," and that means a vivid red fish will be caught. At sixty fathoms the catch may be some *faras*, a highly prized fish, toothless and difficult to hook but one that will make an especially delicious meal. Among the Red Sea reefs there are also barracuda, as at Port Sudan, nearly opposite Jidda.

It would seem reasonable that the fishing industry could be greatly increased by the drying and sending of fish inland to provide an addition to the food supply. A proper investiga-

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tion of this matter might also suggest the possibility of fish canning here and along the east coast of Arabia.

Sharks are abundant in both the Red Sea and the Persian Gulf. At the southern end of the former, a plant was established a few years ago to catch sharks on a large scale. The very tough skins are sold for special shoe leather, the fins have ready sale as food in China, and the oil is recovered for medicinal purposes as it is the chief source of Vitamin "A." This industry also, though in no way presenting as immediate an opportunity as fish drying, might bear serious consideration. Equipment for the development of shark and other fishing is now being obtained.

PEARLING

Although a few pearls have been found along the Red Sea, near Jidda, and to the south, pearling has not yet become a successful commercial enterprise in those parts. On the other hand, the Persian Gulf has a historic reputation as the home of the finest pearls. The synthetic pearls and the Japanese cultured variety have done serious damage to the pearling industry, but the general increase in world prosperity in the past few years has raised pearl prices, with a decided benefit to this area.

Pearling methods in general use have followed the same pattern for thousands of years. The only exception was the use in 1935 of compressed air and deep-sea diving suits by some of the Italians in the employ of the Qusaibi brothers of Bahrain. These foreign divers were evidently not a financial success, as nothing has been heard since then of operations by them in either the Red Sea or Persian Gulf.

Diving for the pearl oyster is carried out in waters up to 60 feet deep. The pearling ships have large crews of divers who alternate between diving and opening and examining

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the oyster shells to extract the pearls. The ships are rigged with poles extending about five feet from the boat sides, with one diver to a pole, and one helper on board for each man in the water. As many divers as possible are crowded into each boat in order to cover the maximum area of pearl oyster sea bottom.

The diver is nude, save for a breechclout and a knife slung to one wrist for self-defense against sharks or the even more dreaded barracuda. He holds a weight, usually an ancient cannon ball or some stone of similar heaviness, attached to a light rope. Another light rope is attached to an open weave basket. When all is ready the diver signals his helper who pays out the rope as rapidly as possible, the weight taking the diver down to the sea floor. There he puts all the oysters he sees into the basket, gives the signal and comes to the surface, either hauled by the rope or under his own power. The basket is also hauled and dumped on the boat deck for opening and searching for the pearls. Some pearl divers use clothespins as clips on their noses, but their only equipment is the aforementioned knife. Ordinarily the crew and divers receive a proportionate part of the proceeds from the sale of pearls recovered, less deductions for food and expenses.

Between Yenbo and Umluj on the Red Sea coast there is a marine growth called "black coral," said to be peculiar to this region. Coral prayer beads set in rosaries of 33 or 99 beads each are sought throughout the Moslem world, and cigarette-holders, commanding high prices, are made of it at Jidda. This black coral is obtained by divers.

WEAVING

Most Bedouin families weave from goat's hair, sometimes mixed with coarse wool, the heavy, carpetlike cloth of which

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their tents are composed. These tents are usually black and, save for one side, closed to the sun. Unlike light canvas tents, they do not reflect the white sun rays, and the temperature within is degrees cooler than outside. Strips, usually about 24 inches wide, are sewn together to give any desired size. The length varies, some great shaikhs' tents being 100 feet long by 20 wide, with partitions of the same material to separate the women's and other quarters.

Rugs of different colors are also woven and sold in the market places of larger towns such as Taif and Jidda. The best are of the natural white, brown and black colors; the red, yellow and other dyes are neither pleasing to the eye nor permanent. Usually a rug is made up of two pieces, each 20 to 30 inches wide, loosely sewn together and averaging a length of 9 to 12 feet. The Bedouin weavers fix small stakes in the ground, on which the warps or longitudinal cords are fastened, while a small wooden shuttle is used to weave the weft or transverse cords. A similar weave serves in the making of camel bags, indispensable to every family when traveling, for carrying small utensils, coffee equipment and other household goods.

Taif is the center of manufacture of the blanketlike coats known as *beedis*. White wool is commonly used, in the form of tightly twisted yarn matching that of the camel bags. Tighter weaving than that applied in the case of tent cloth produces a fabric which, as we have seen, sheds rain for a short time and provides an excellent cover from the heavy dews when sleeping beneath the stars.

Hofuf in the Hasa deserves credit as the principal manufacturing center of the gown which forms the universal costume of the Saudi Arabian. Everywhere known as *mashlah*, except in Syria where its name is *aba*, this outer garment is distinguished in its Syrian form by a specially attached hood.

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The decoration about the neck is peculiar to the *mashlah* of Najd, and there is no hood as in Syria.

There are several types of *mashlah*, the better ones being woven of camel's hair, whereas the inferior grades are of wool or wool mixed with camel's hair. Heavily woven thick types are intended for cold weather, and loosely woven, light, transparent weights for summer temperatures. The generally preferred color is brown, the buff and black being less popular; and in shape they approach the sleeveless academic gown of the Western world, averaging 63 inches in width, and 44 in length from the shoulder to the ground. The neckline is cut square at the back of the neck, averages 8 to 9 inches across the back and is heavily embroidered with gold thread. This gold embroidery, which is beautiful throughout and worked with great skill, continues for about 20 inches down the front of the gown in a tapering band. On either side of its neck opening the gown has gold cords, adorned with gold balls set two inches apart and an inch in diameter each, terminating in three smaller gold balls. Both the weaving and embroidery are executed by male artisans working with hand-loom at home.

Out of palm leaves there is almost universal weaving of mats, used on house floors and ceilings. In Asir, baskets of all sizes are expertly woven. Southern Tihama also furnishes some especially attractive baskets, serving often as interior ornaments in the houses and hung on wall pegs. In the vicinity of Abha and the high plateau country, the baskets have stiff wooden frames. Grass mats are woven throughout the realm. In their rectangular shapes they are designed to serve as prayer-rugs and beds, whereas circular ones are spread on the floor in the place of dining-tables, which are still rare except in the royal palaces, Jidda and the vicinity of the oil and mining camps.

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BAKED POTTERY

The chief pottery product is the water jar used by pilgrims on their journeys. Slightly porous, this jar permits the water to seep to the outside of the vessel where the intense heat causes evaporation and cools the water within. A similar water container is known to the Mexicans, Portuguese and other hot-climate peoples. Although Jidda makes most of this pottery, a variety of small pottery jars and vases, as well as tops of water pipes, are made in Medina and Asir. Other types of pottery jars and receptacles have been made for many centuries, as revealed by the fragments strewn over the entire country, especially at Jabrin, Aflaj, Najran, and along the ancient mine dumps scattered from Asir to Midian in northern Hijaz. Some of the green slip pottery found at Mahad Dhahab was assigned to the tenth century A.D. by experts of the British Museum.

The baked pottery industry is relatively small since clay and marl in sufficient quantities for pottery manufacture are only available at the seacoast. A strange sort of pottery, hardly thus to be classified, is that carved out of soft andesitic schist into various types of open dishes and lamps. There are large mines south of Taif and north of Duwadami which produced this material.

BOAT BUILDING

Boat building is an important industry in most of the seaports, especially Jidda and Jizan. The keel and ribs are of wood cut in the mountains of the interior; the natural curves of tree trunks, limbs and crotches are skillfully fitted into the boat frame. There is no steaming or artificial bending of the wood. The side planking or skin, as well as the decking, is usually of the teak family, imported from India or Java. In many cases the iron spikes are made by the local blacksmiths,

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and driven into drilled holes, the large flat heads made water-tight by collars of local raw cotton twisted about them. In many instances, side planking is cunningly sawed to fit by overlaying one plank on another. Caulking is done with oakum soaked in oil or tar. Sesame oil and other imported oils are used to paint and to mix with paint. Locally made pigments of white, green and red are in general use.

It has been said that the graceful lines of the double-pointed Red Sea fishing dhows are identical with those of the ancient Phoenicians which first traded between the eastern Mediterranean and Cornwall. The lines of the dhows used as lighters in the various harbors are different. Much broader in beam and with blunter bow and square sterns, they are not as pleasing to the eye. But the single mast, raked forward, with the large lateen sail, is common to both types. In the Persian Gulf the dhows are again different, except for the sails. Their bows and sterns are vertical instead of overhanging. A large tank scow for fresh water is normally towed behind pearling dhows, as the crews are large, consisting of the divers as well as the sailors.

5. The Water Supply

THE water resources of Saudi Arabia, like those of almost every other part of the world, are dependent upon climate, geological formations and topography. In this respect the country falls into four distinct divisions: 1) the southwestern region; 2) the northwest and central region; 3) the districts of the Ain al-Heet, Kharj and Aflaj water pits; and 4) eastern Hasa.

THE SOUTHWESTERN REGION

This region consists of Asir and southern Hijaz. In the Asir mountains the rainfall, as noted above, has been estimated largely on the basis of vegetation at 10 to 12 inches. Many of the terraced fields on the eastern mountain slopes seem to rely on rainfall alone for crop production. Nearly all of the western slopes are too steep for cultivation. The stream beds, strewn with boulders, show that large amounts of water flow down them at times; in the Wadi Itwad many miles of perennial flowing water pass through one small stream. In the Red Sea coastal plain of Tihama, the rainfall seems to be similar to that of Jidda, that is, an average of 3 to 4.5 inches. The densely populated areas, from Lith to the border of the Yaman, are supported by the flood irrigation of the fertile silt brought down from the Asir mountains several times a year. Here the "bolsa" type of irrigation, common in southern Arizona and parts of Mexico, is used entirely. The red and white sorghum crops, observed at Darb and Baish, with stalks measuring as much as 17.7 feet in height, prove the fertility of this soil. Similar crops appear for approximately 300 miles along the Tihama coastal plain from the Yaman to Kunfida. To the north of Darb are the wadis supplying the water and soil for the districts about Wadi Hish-

WATER SUPPLY

ash, Wadi Hamatha, Gahama, Dahaban, Khor al-Birk, Wadi Amk, Wadi Sherga, Hali, Wadi Yetha, Kunfida, Wadi al-Asiba and Lith.

There are at least two rivers between Darb and Baish whose floods, still unused, could be made available by suitable diversion dams. Those noted are Wadi Samra and Wadi Bedth. These flood irrigation areas extend for a length of 300 miles south from Lith to the Yaman border. The Tihama plains, varying in width, are far from being continuously fertile. As noted previously, several lava flows extend from the mountains to the seashore between Shuqaiq and Khor al-Birk. It is possible, however, that close investigation might reveal storage dam sites, also well sites, which might provide additional water for irrigation. There is sufficient suitable soil for extending arable areas considerably.

On the eastern side of the Hijaz mountains the rainfall decreases rapidly until, within 50 miles or less, it is down to the general average of 3 to 5 inches. On the southern boundary of Asir, east of the mountain ridge and adjoining the Empty Quarter, lies the ancient area of Najran, where numerous evidences of the extensive and enlightened Himyar occupancy appear. At the head of the Najran valley was the ancient dam called Mufija, though the basin above this ruined dam is of too steep a grade and small an area to justify its rehabilitation. Four miles downstream is an excellent dam site called Jabal Raoum justifying careful recordings of flood and general water flow on which estimates for a storage dam might be based. Such recordings would include tests of bed-rock and abutting rock formations. Should a dam prove economically feasible, many acres could be reclaimed near the mouth of the Najran valley.

The water table throughout the 15 miles from the dam site is indicated by wells, 12 to 15 feet below the present

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ground surface. The level is reported to vary little and the supply is ample. It was estimated that only one-fifth of the arable area is at present under cultivation.

The great springs at and adjoining Ain Husain show a plentiful supply of unused water close to the surface. Soil and climate make an attractive prospect for the production of more dates, sorghum and alfalfa, besides the establishment of crops of sugar cane, wheat, cotton, with numerous vegetables and fruits. Some 200 miles north lies the great Wadi Dawasir, with its extensive branches. Great quantities of water flow through it, as evidenced by banks of silt, gravel and boulders. Bisha has a stable water table at 30 to 50 feet, depending on the contour of the surface. The best dates in southwestern Saudi Arabia are raised here and exported to other districts. There are probabilities that sufficient water could be pumped from additional wells in the great Wadi Bisha bed and in the table on banks parallel with it to increase substantially the productive area. The U.S. Agricultural Mission recommended the planting of many *athl* (tamarisk) trees in the river bed and along the banks in order to develop gas-producing fuel for the operation of pump engines. This is now being done in the vicinity of Medina.

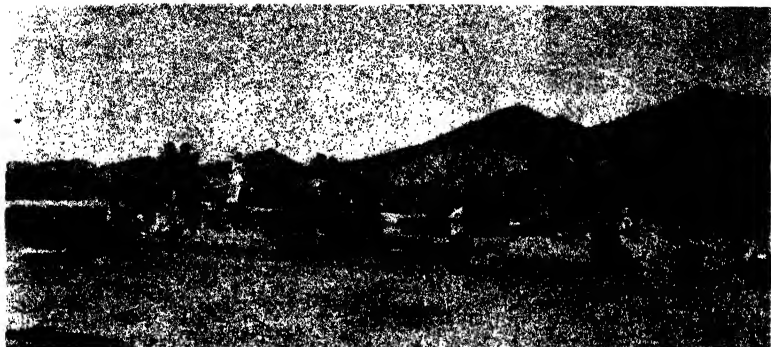
The Wadi Bisha, for 170 miles down to its confluence with the Wadi Dawasir, has a great amount of subsurface water. On the way to Sulaiyil, some 55 miles beyond, one encounters many date groves and space for many more. Though brackish, the water is suitable for date culture, its depth being 2 to 4 feet at the wells and pits examined. Some new date offshoots have been planted recently, showing ambition and enterprise on the part of the Arabs. Ruins of buildings and small palm groves appear on the tributaries of the Wadi Dawasir. Those on the Wadi Tathlith, Wadi Hamdh, Wadi Bisha and Wadi



King Abdul Aziz ibn-Saud, with one of his youngest sons
at Kazam Palace, Nuzla, Jidda



The Mecca Gate in the Jidda city wall



The Bir well Joharana, which supplies the sweetest water in the vicinity of Mecca



Waziria Garden, developed in the desert near Jidda to demonstrate the water possibilities of that area



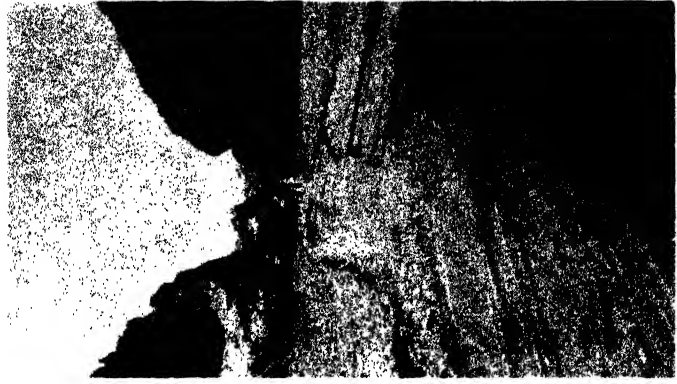
A sunken date grove at Wadi Fatima, 34 miles from Jidda



Cistern constructed by Queen Zubaïda (c. 780 A.D.) at al-Birkā, Hijaz, for the *Hajj* pilgrims



Constructing a "cut and cover" tunnel to convey water from Wazirā to Jidda—the same method employed by engineers of Queen Zubaïda



Site of the ancient Mufija dam in Najran, Asir



Four discharges at one of the great springs at Hofuf, al-Hasa



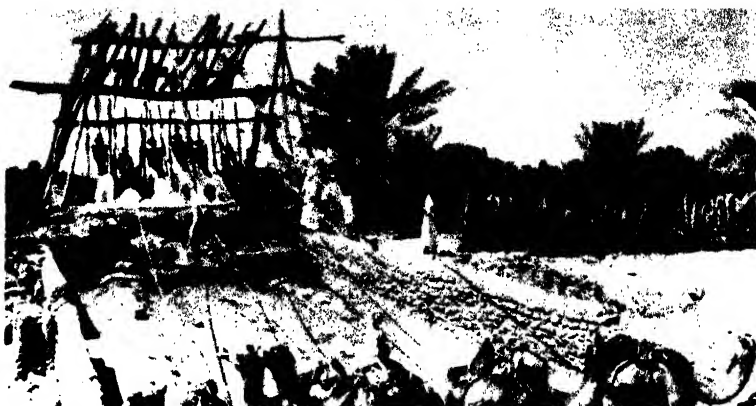
The discharge from Ain al-Hodud, one of the largest springs at Hofuf, yielding roughly 22,500 gallons a minute



Ain Darush oasis, west of Qatif, al-Hasa



Ain al-Dauba oasis, Hijaz



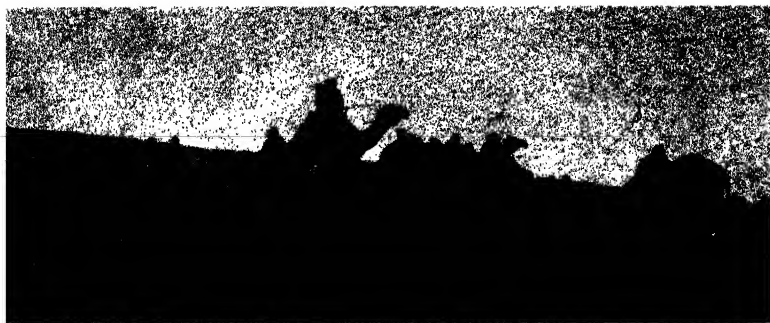
Six-camel pumping plant at Yamama near al-Kharj, Najd



One of the two largest water pits at al-Kharj Reclamation Project, Najd



Four deep-well turbine pumps, each with a capacity of 4,450 gallons per minute. at al-Khari



Camels watering at Bir Ruma, in al-Hasa



Ain al-Husainiya, near Dhat al-Oktood, Najran, Asir



The spring and the mosque at Dhahran, al-Hasa, with an ancient Portuguese fort in the right background



Pulling rice plants for transplanting, at Hofuf, al-Hasa



Transplanting the rice plants. They are planted widely apart to promote growth of larger rice heads



Treading out the corn by oxen in the Biblical fashion,
at al-Kharj Reclamation Project, Najd



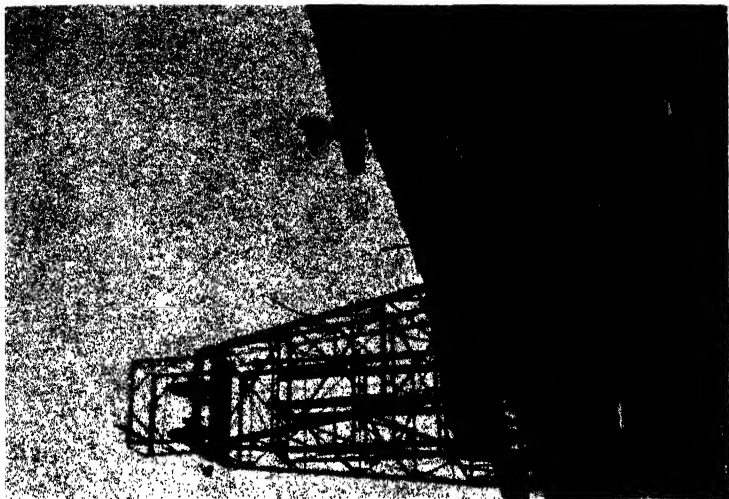
Threshing wheat with modern American machinery at al-Kharj



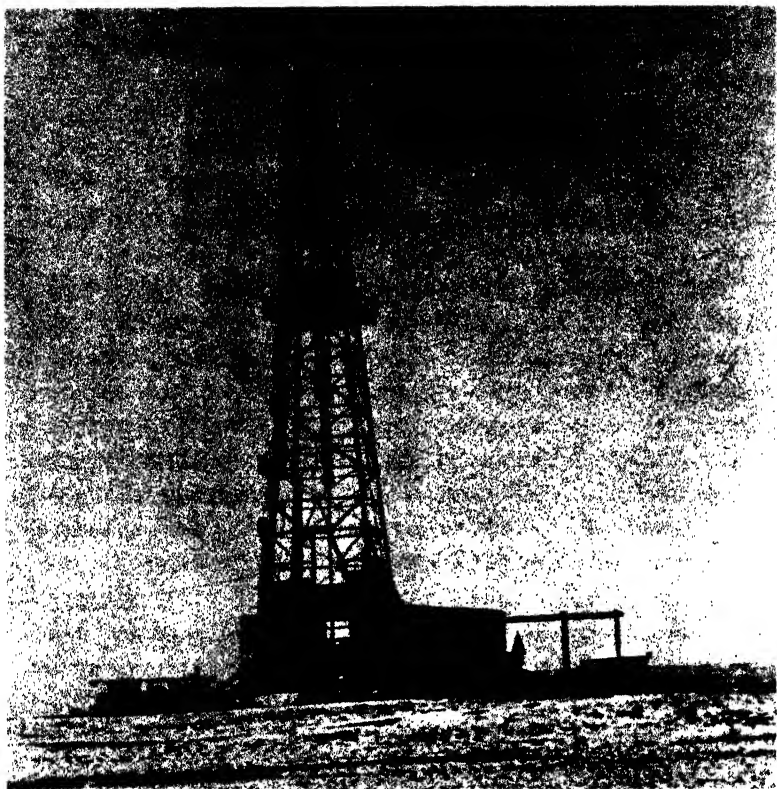
Mining the ancient tailings at Mahad Dhahab, Hijaz,
on the border of Najd



The Saudi Arabian Mining Syndicate, Ltd.,
mill at Mahad Dhahab



The Mahad Dhahab mine headframe over the main shaft
325 feet deep



A producing oil well at Dhahran, al-Hasa



The oil town of Dhahran, built by the American Arabian Oil Company

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Ranya point to the existence of a larger population in the past.

THE NORTHWEST AND CENTRAL REGION

This region includes central and northern Hijaz, and all of Najd and western Hasa, excepting the great water pits of Ain al-Heet, Kharj and Aflaj.

On account of the annual pilgrimage to Mecca, the water supply of Jidda, Saudi Arabia's foremost port on the Red Sea, is of vital importance. It is reported that in some years upwards of 125,000 men, women and children land at this harbor and travel the 43 miles to the Holy City. Aware of the water problem thus created, the Turks some sixty years ago constructed a water system which drew a stream from the wadi, or river bed, at Ain Waziria, 6.8 miles east of Jidda. The stream of water runs through a "cut and cover" tunnel for the first third of the distance, and through a pair of 5-inch terra cotta pipes the rest of the way to the city. The pipes employed were similar to the Roman system I uncovered in Cyprus. In order to help regulate the water situation at the city, the late Charles R. Crane of New York presented a 16-foot windmill and auxiliary gas engine complete with pump equipment and piping which, when I installed it late in 1931, raised an average of 40 gallons of water per minute. The city has two other sources of water; the one, its principal source of drinking water, consists of condensing units producing 135 tons of fresh water in twenty-four hours; the other gives a precarious supply from cisterns and pits which preserve the run-off from rains.

In 1942 the U.S. Agricultural Mission investigated and reported upon an adequate fresh water supply which would lead spring water from the north side of Wadi Fatimah to Jidda through 34 miles of pipe or covered masonry conduit.

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With an efficiently laid conduit of sufficient size there might be gravity flow. The consequent avoidance of pumping equipment would be of great advantage, but careful surveys and investigations are required. Very recently (1946), the Finance Minister informed me that an ample supply of excellent quality water had been developed in Wadi Fatimah south-east of Hadda.

In the Wadi Fatimah lying between Jidda and Mecca, there are several springs along the northern side and a large amount of subsurface water. The latter is derived from the spring-fed irrigation water, as well as from floods—or *sayls* (torrents)—coming down from the Hijaz mountains. An enormous amount of work has been done in excavating areas to bring them low enough to be irrigated by the springs. As all the spoil was dug with a sort of hoe and carried in baskets—usually on the laborers' heads—the effort involved suggested that of ancient Egyptian enterprises. Many thousands of tons of spoil were handled to make those gardens. This sort of sunken garden is even now being excavated near Anaiza in Najd.

Mecca is the political capital of Hijaz, and the religious heart of Islam, where non-Moslems are denied entrance. Its water supply is derived through a "cut and cover" tunnel from Ain Zubaida, about 9 miles southeast. Queen Zubaida, after whom the spring is named, wife of the Abbasid Caliph Harun al-Rashid, was both devout and generous. She made several pilgrimages from Baghdad to Mecca. It is said that she directed her engineers about A.D. 800 to make an ample water supply for Mecca. She also ordered the construction of watering places along the entire caravan route from Mecca to Baghdad at intervals of a day's march. These consisted of cisterns to catch the run-off from rains, and wells—which-ever was the more efficient. Several of both types have been

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in continuous use for over a thousand years. The locations of these works, the types of material used and the methods of construction all show great skill.

Other ports of importance are Yenbo and Wejh, situated 200 and 400 miles respectively north from Jidda. Yenbo is supplied with water by a condenser and by cisterns; Wejh depends upon cisterns and wells.

The city of Taif, 138 miles from Jidda and 5,200 feet above it, is the summer capital of Hijaz. The gardens here are noted for grapes and other fruits, as well as vegetables. Barley and wheat also thrive. There are a few springs which emanate from the granite and gneiss, but most of the water for irrigation is obtained from wells. The average depth seems to be 30 feet, but some wells are 90 feet deep. Windmill, gas engine and electric-driven pumps are in use, in addition to the time-honored skin buckets raised by camels or donkeys.

The Viceroy, Amir Faisal, and the Finance Minister, Abdulla Sulaiman, are developing farms within a few miles of Taif. At Sharia, near Mecca on the road to Taif, another farm is being energetically developed by the Assistant Minister of Finance, Shaikh Hamid Sulaiman. King Abdul Aziz is encouraging all possible water and agricultural development, for he, his ministers, and all the nation's leaders realize that the soundest prosperity is based on local production of sufficient food to support the population.

As non-Moslems can only visit Taif by special permission of the Saudi Government, this district has not been extensively investigated by foreign engineers. Mr. Nils Lind of the U.S. Department of State, attached to the American Legation at Jidda, made the first, and a most excellent, report in 1945 on ancient dams and evidences of former reclamation projects in the region. Prince Mansour, Acting Viceroy in the absence of Prince Faisal, and the Minister of Finance wished a more

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technical report on irrigation possibilities, and accordingly, during August 1945, I made an investigation of the local dams.

To sum up my findings very briefly: There are eight dam sites in the region, several of them already containing dams of ancient origin. Sud Sayaud (*sudd* being the Arabic word for "dam"), about 6 miles east of Taif, possesses Kufic inscriptions on its rocks which read in translation: "This dam, belonging to Abdullah ibn-Muawiya Amir Almominin, built by Abdullah Ibrahim by Allah's instruction, 58 Anno Hegeira [A.D. 680]." The structure of the dam, in which no mortar or mud was used, is today in excellent condition, a 1266-year tribute to the engineering skill of Abdullah Ibrahim.

Other of the ancient dams need reconstruction or reinforcement to obtain maximum efficiency. For instance, Sud Somalagi Dam, 19.4 miles southeast of Taif, might create very considerable additional crop production in the Somalagi valley if it were repaired. Sud al-Jamajim Dam near Wadi Muhrim, 8 miles northwest of the city, though a new dam, was built too narrow in cross-section and has washed out several times. I gave the Director of Finance a rough, safe type of design, in hope that the next repairing might be permanent. This dam backs up subsurface water so that wells furnish irrigation water for the higher ground on the sides of the basin.

Shaikh Saleh Gezaz, the Director of Finance, wished me to see a possible site in the great Wadi Wejh, the largest river valley in the vicinity. We "jeeped" up the river bed for 14.5 miles and then walked a half-mile to al-Kharrah, at an elevation of 5,600 feet. Up to this point there are many benches and fields on both sides of the river bed, showing some present cultivation and evidences of considerable more farming

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in the past. At the bend of the river at al-Woohait, 9 miles above Taif, a great eucalyptus tree is growing, and a nut pine. Citrus fruits would thrive here. The valley narrows abruptly at al-Kharrar, and while there are excellent abutments for a 250-foot dam, the valley continues to be too narrow—it is more of a gorge than a valley—with too steep a slope, to justify such a high structure. However, three miles nearer Taif is a site called Shab al-Jeleed which, with the exception of that at Jabal Raoum in the Najran valley, is the most attractive one I have seen in Saudi Arabia. An appropriate dam (105 feet high, with a basin 6,000 feet long, an average width of 500 feet and water depth at the dam of 100 feet) would be of tremendous benefit to the gardens in the Taif district, as well as down the 11-mile valley to that city.

Among other potential water resources of the province, mention must be made of the extensive Wadi Hamdh, one of whose heads is near Medina. There are many arable areas similar to that examined at Malalia, approximately 50 miles north of Medina along the Hijaz railway line, where the water table is 8 to 12 feet below the surface, depending on the season of the year. Although slightly alkaline, the water is suitable for the irrigation of dates, alfalfa and sorghums. In many parts of this valley ample soil and water are available for a substantial increase in population.

Similar conditions prevail in Wadi Jizal, a tributary of Wadi Hamdh, to the southwest of al-Ula, where signs of former occupancy are in evidence, although the only present inhabitants of this area are nomadic Bedouins. The efficient planting of tamarisk trees to protect the river banks, and to provide charcoal fuel for operating gas-engine pumps, should bring a considerable area into production and support a great number of families. References to the fertility and richness of this district are found in the works of classical Arab his-

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torians and geographers. The development of the region offers opportunities for the settlement of small units of 5 to 10 acres.

Hail is the most important city in the great northern highland area of Najd. The soil and water are efficiently used here and tapped to near their limit. Irrigation water, almost entirely obtained from wells, is at a depth of 30 to 80 feet, although in one small area it is but 8. The typical primitive method of raising water in skin buckets, hoisted by animals down inclined planes, is used exclusively. At Anaiza, excavations similar to those of the sublevel gardens bordering Wadi Fatimah have been made, and are still in progress, bringing the gardens down to a level where the river bed of Wadi Rumma will irrigate the date groves and other plantations without the necessity of pumping.

There is another interesting water development in the Wadi Rumma, about 7 miles north of Anaiza, in a small, shallow flowing artesian water area. Locally handmade drilling tools are improvised to dig holes, penetrating an aquifer underlying a hard sandstone which in turn is overlain by the river-bed gravel. Several wells are yielding flowing water. Since flowing artesian supplies have had the sad experience of overdrilling in Utah, New Mexico and California, the Saudi Arabian Government was cautioned to regulate the number of holes in order to forestall depletion. All along the Wadi Rumma there were seen evidences of a large subsurface water supply. Numerous villages, with many gardens and cultivated fields, stretch from Buraida to al-Rass and Oglat al-Sughour.

Another productive district is that of Khaibar, lying among the *harrahs*, or great lava fields, a hundred miles north from Medina. The general elevation is 2,200 feet above the sea. The extensive date groves, settlements and the town of Khaibar

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lie between tongues of lava. There are numerous springs emanating from these flows. Too much water seems to be the case at Khaibar, for there is such a plague of the anopheles malaria-carrying mosquito that much of the land belongs to nonresident owners. Most of the present permanent inhabitants are descendants of African slaves. One of the greatest needs here is adequate drainage to prevent alkalinity, as well as to lessen mosquito-breeding areas.

There are inscriptions, records and legends indicating that perhaps 1,500 years ago this region was occupied by Jews. Six dams for storing irrigation water are reported, of which I inspected one called "Sud Haseed." This dam is made of cut stone with lime mortar, and is 15 miles southeast of Khaibar village. It is 182 feet long at its base, 270 feet along its crest and 28 feet high above its stone pipe outlet. The capacity, as measured by A. L. Wathen, irrigation engineer of the U.S. Agricultural Mission, is 750 acre feet. The mud flood-line showed that the surrounding lava was so porous that the full capacity of the dam, greatly exceeding the figure given above, never was used. This dam could be cheaply rehabilitated, and the other five are said to be similar to it.

A description of the water resources of this section of Arabia would not be complete without one final reference to the form of drawing water which has perhaps been the most vital factor in the life of the nomad and Bedouin travelers. Hoisting of water by men, women and camels from as much as 170 feet—the greatest depth observed, at Bir Rumah, on the western edge of the Dahna—is typical of many wells on the main caravan routes. The inflow of these caravan wells usually varies between 5 to 30 gallons per minute. Other watering places on the main caravan and motor route across Arabia, from Jidda on the Red Sea to Jubail on the Persian Gulf, may be of interest. It should be borne in mind that the

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depth at which water is reached often varies according to the season, so the following figures must be taken as approximate:

Birka	cistern
Muwai	20 feet to water
Dafina	80 feet to water
Afif	70 feet to water
Qaiaya	4 feet to water
Duwadami	9 to 20 feet
Khuff	12 feet
Marrat	surface
Awanid	20 feet
Jubaila	24 feet
Riyadh	50 feet
Rumah	170 feet
Maagola (Umm Ogla)	flowing artesian
Uwainid	35 feet
Hinnot	12 feet
Jubail	flowing artesian

DISTRICTS OF AL-KHARJ AND AFLAJ

The water pits of Ain al-Heet, Kharj, Khafs Daghra and Aflaj are similar, in that they are huge natural wells, ranging in diameter from 150 to 1,500 feet, and from 420 feet upwards in depth. It seems that these pits have been formed first by a slight faulting or torsion which caused cracks in the sedimentary beds down to the main aquifer. The cracks were gradually enlarged by the ascending waters, which dissolved out the limestone but more especially the gypsum with which many of the sedimentaries are impregnated. Gradually the process formed caverns, the roofs of which finally broke when the span became too great, creating open pits.

As investigated and worked out by the oil company geologists, the source of the water is rainfall on the watershed of

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the Tuwaiq mountain range, lying 150 to 200 miles west and running in a north-south direction for 500 miles. The western slope constitutes the main drainage basin.

Ain al-Heet is the first area containing these water pits, as one travels south from Riyadh, but Kharj has a larger group and lies 56 miles distant from the capital and at an average elevation of 1,500 feet above the sea. The two connecting pits of Kharj, called Ain Dhila and Ain Samha, are each about 300 feet in diameter and 420 feet deep. Another pit, named Umm Khisa, lies nearly a mile farther west, and is of about the same diameter but only 45 feet deep. It is probable that the source of water supply is the same as at the other two pits, although the caved-in limestone fragments have not as yet been removed by solution. An area of 3,500 acres is now under cultivation with the possibility, if the plans of the Finance Minister are put through, of an ultimate increase up to a total of nearly 8,000 acres.

The geologists and engineers of the oil company have accomplished much in studying water possibilities, drawing up reports and laying out irrigation canals. The mining company has assisted in recommending and purchasing various equipment in behalf of the Government. The American Government sent the U.S. Agricultural Mission to study and report to King Abdul Aziz ibn-Saud on the water resources and agricultural possibilities of his country. They spent several weeks at Kharj working out some specific problems. The U.S. Lend-Lease Administration sent pumping equipment for Kharj to increase production at the earliest moment. Early in 1944 equipment also arrived in Arabia designated for testing the immense water resources at Afaj.

The Khafs Daghra project, consisting of only one water pit, is 27 miles to the southwest. The water lies about 60 feet below the ground surface and is of unknown depth. The pit

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resembles those of Kharj in every respect except its diameter, which is about 150 feet. About 800 acres are now under cultivation, producing a higher quality of wheat than that of Kharj on account of superior soil.

A third group of water pits is in the district of Aflaj, 156 miles south from Kharj, 212 from Riyadh. The elevation of the largest pit, Ain Rass, is about 1,700 feet, and the water surface is some 27 feet below the general ground level. The depth of the water is unknown but the Governor stated that a weighted rope of over 400-foot length had failed to reach the bottom. The area is estimated at a length of 2,000 feet by a width of 800. From the rim are seen the remains of three large irrigation ditches lying side by side but at increasingly lower levels, indicating that the water level has receded a total of 27 feet during the last 2,000 years. Decrease in rainfall, increased evaporation and the destruction of trees and vegetation might have caused the lowering of the water level. The two fortresses and tunnels near here invite archeological and geological investigation in an area which only about half a dozen Westerners have visited to date.

There are four other water pits in the Aflaj district: Ain Burj, Ain Heeb, Ain al-Botn and Ain Shaghaib. The first three are connected together; the first two are estimated at a length of about 1,000 feet by a width of 250 and 350 feet, respectively. The third, Ain al-Botn, is about 100 by 50 feet. The fourth, Ain Shaghaib, lies about half a mile to the west; its surface is about 15 feet higher, and the diameter may be set at 200 feet. The depth of all these pits is unknown, but indications are that they approximate that of Ain Rass, that is, are over 400 feet deep. If the inflow is proportional to that of Kharj, an immense amount of water may be made available by pumping. To this end a pump, raising 4,500 gallons per minute, was shipped to Saudi Arabia by the Lend-Lease

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authorities. There are said to be seventeen villages in the Aflaj district, with Laila as the headquarters of the Governor, al-Amir ibn-Zair, a distinguished and loyal Najdi.

A broad area of sand loam, suitable for irrigation, lies to the east and north of these pits. Soil and climate favor the growing of wheat, barley, rice, alfalfa, *durra*, pomegranates, apricots, peaches, grapes and vegetables. The present crops are dates, alfalfa and sorghums (*durra*). The inhabitants are of the Bedouin pastoral and Murra tribes who care for little other than date cultivation and the tending of their herds and flocks. Since they despise agriculture, the farmers who are to cultivate this extensive and promising area would have to be brought from other parts of Saudi Arabia. From the Tuwaik mountains, rising to the west, a certain amount of timber is now obtained for use in the Kharj project. As elsewhere, the growing of *athl* trees here will further the irrigation project appreciably.

EASTERN HASA

Insofar as water supply in Saudi Arabia is concerned, the eastern Hasa region possesses the greatest potentialities. Probabilities of flowing artesian wells exist in a stretch of land extending a distance of over 100 miles west of the Persian Gulf and parallel to its coast. Bearing out this opinion are the wells drilled by the Arabian American Oil Company at its Khobar, Abqaiq, Jubail and abu-Hadriya camps, north and south from Dhahran; by the Saudi Government in many localities at Jowia west of Abqaiq and at Hofuf; and by private interests, between Qatif and Khobar. The average depth of this artesian flow appears to be 200 to 300 feet, near the coast, but about 800 feet at Hofuf. Artesian well drilling was initiated in 1930 on Bahrain Island by Major Holmes.

In addition to these man-made water developments, a still

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larger supply, in the oases of Hofuf, Qatif, Sofwa and Tarut, consists of immense flowing springs. The largest flowing spring at Hofuf, already mentioned as discharging 22,500 gallons per minute, is named Ain al-Hakl, in keeping with the practice, observable in many lands where a society has lived for thousands of years, of assigning a proper name to nearly every place of interest. The flows of three other springs in the Hofuf oasis have been estimated at 20,000 gallons per minute each. Five other springs show an estimated discharge of 800 to 4,000 gallons per minute. The Hofuf oasis, by far the largest in Saudi Arabia, has an average elevation of 500 feet. The oil company engineers have reported that the total area, in which more than two million date palms grow, measures about 25,000 acres.

There are in this neighborhood two other areas of about 5,000 acres each, which may be brought under cultivation if steps are taken towards their irrigation through the use of water now going to waste, plus a small supplementary amount of artesian flow. The crying need of Hofuf, and of the entire cultivated soil of Hasa as well, is for adequate drainage systems. Possibilities for a substantial increase in productive land in the eastern artesian-fed belt in Hasa are immense.

Among the other three great oases, Qatif, Sofwa and Tarut Island, the largest spring, known as Ain Darush, is situated in Sofwa and has a per-minute flow of 900 gallons. Large springs, though with a lesser flow than that of Ain Darush, mark Qatif, and Darain on Tarut Island, as well as Bahrain, 22 miles off the Saudi Arabian coast. One of the submarine water springs in the Persian Gulf occurs a few miles north of Jubail where a spar buoy marked its location, by order of King ibn-Saud. Pearling boats are said to replenish their fresh water supply here. When we sailed past it in 1932, a

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sailor dove down from our launch with a skin bucket and brought up fairly fresh water. Plugging these submarine springs with cement, in order to conserve the great waste of water, has been recommended.

The last water resource to be noted in Hasa is that of the Jabrin oasis on the edge of the Empty Quarter. Lying at the junction of two ancient incense routes—from Oman to Mecca and Saihut to Baghdad—this oasis has an area estimated at 7,500 acres and an altitude of 700 feet. In July 1942, I recorded here a water table that was 8 to 20 feet below the surface, giving credit to Bedouin reports that in winter months most of the oasis was boggy, presumably due to diminished evaporation although it has a low rainfall of 2 to 4 inches. Throughout the area visited, pools of mosquito-breeding water were seen, which would account for the absence of permanent habitation.

Belonging to the four hundred families of the Murra tribe, this oasis is frequented by them twice a year—in the spring to pollinate the palm trees, and in the autumn to harvest the dates. An attempt, undertaken at the instigation of the King, to establish a permanent settlement of the *Ikhwan* in this oasis was later abandoned on account of a heavy malaria death toll. An efficient drainage system might eliminate malaria and facilitate agricultural productivity. Listening to suggestions regarding improved living conditions, the local Amir said with unfeigned pride, "We are Bedouins, not farmers. We tend our camels, sheep and goats, coming here, only when necessary, to pollinate and to harvest dates." And the Murra tribe has the same attitude at Aflaj.

Nevertheless, the development of water and agricultural resources goes on despite Bedouin disapproval. Fostered by the King, the princes and ministers, zeal for agricultural development has spread in the ranks of laborers in the

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concessionaire companies. While their rulers promote the reclamation of old as well as new acres, seeking the advice and assistance of friendly governments and locally operating companies, the laboring class, largely employed by the oil and mining companies, save their wages with the hope of eventually purchasing small date groves and plantation lands. This movement has received an impetus since 1935 when oil and mining companies, save their wages with the hope of engaging native workers on a large scale, raising the living conditions and purchasing power of thousands of Saudi Arabians. The foundation of all progress was firmly laid when King Abdul Aziz ibn-Saud made life and property safe and secure within the borders of his kingdom.

6. Transportation and Inland Routes

SAUDI ARABIA's transportation and inland routes systems hinge on the use of the camel, and to a lesser degree the ass, supplemented in recent years by the coming of the automobile.

With an average speed of two and a half miles per hour, the camel is the chief vehicle of transportation employed on the long caravan routes of pilgrims, traveling towards Mecca from Asir and Yaman, in the south; from Palestine, Syria and Iraq, in the north; and from Najd, Kurdistan, Afghanistan, China and India, in the east and north. The camel of Saudi Arabia is the single-humped dromedary, distinguished from the two-humped variety of Asia by its greater speed and size. Like the horse, the riding qualities of camels differ, ranging all the way from those of the type used in long-distance caravan travel, comparable thereby to the American draft horse, to the beautiful, cream or white *dhalul* (riding camel) of Oman, which reputedly goes fifty miles in a day, a counterpart as it were, to our best saddle horses or thoroughbreds.

Camels have a way of bucking—also a trick of dropping suddenly on their front knees, in the manner of a western broncho, though not nearly as quickly. For a novice, the sudden jerk could entail a serious fall on the head. The camel seems to take it for granted that the world is against him, for he usually grunts and groans whenever his master approaches him with the saddle and load. One rides sidesaddle, if he is wise, a leg curved around the forward horn, while another horn forms the back or cantle; each horn as a rule terminating in a ball with a sharp edge for ornament. The motion of the camel discourages one from leaning back, while any thought of sleeping or lolling seems out of the question. Stirrups are marked by their absence, and the single line to

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the bridle serves as a kind of halter without bits and woven of many colors.

The wooden saddle frame is usually covered with a sheepskin, and long bands of heavy woven wool, each about two inches wide, cover the camel on either side, reaching halfway to the ground. These bands keep off the flies when the camel is on the march, and ornament the highly prized animal. Additional dress may include a skin, or a woven or embroidered breastplate hung over the camel's chest from the horn of the saddle. A group of these camels, mounted by the characteristic soldiers of Najd, known as the *Hajjans* (dromedarists), is a magnificent sight, especially as the cavalcade comes charging over the sand. Although they run in a grotesque manner, the usual gait of a camel up to twelve miles an hour is a pace in which both legs on a side swing forward simultaneously. On a fine *dhalul* this gait is very pleasing up to six or seven miles per hour, but on the regular freight-carrying stiff-legged camels, the motion can be irksome to the inexperienced. The pilgrims ride a kind of camel "pullman," equipped to carry two persons or a family, which is commonly known as a *shaqdaf* (camel-litter), with a light structure fitting over the camel's hump, having a woven rope bedstead about two and a half feet wide by four and a half feet long, on either side, and enclosed in a wicker canopy covered with grass matting or Persian rugs, according to the wealth of the occupants.

Due to their double joints, camels "couch" or lie down in a peculiar fashion of their own. A soldierly *Hajjan* will mount a young camel of the fast-riding *dhalul* type by climbing up its rump, using the tail as a handle, and thus onto its back, or by jumping up onto the neck. Except on wet surfaces no animal is more sure-footed than the camel, which may be trusted to take the load of two mules down a steep

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trail. As a carrier it rates highest among beasts of burden, aside from the elephant, but when tractive effort is required it demonstrates poor quality. The average freight carried by an able-bodied camel is 100 kilograms (220 pounds), on either side, making a total of 440 pounds per animal. A quarter of a ton might be loaded on a camel, but more ordinarily the load is less than 400 pounds.

It was suggested above that the famous breed of white donkeys from the Hasa deserves to be greatly increased as an adjunct to agricultural development. They operate like camels in hoisting the water-skin pumps, but they discharge their greatest function, however, as carriers. The small type of oxen native to Arabia are good as draft animals and, though smaller than the Hasa donkeys, they contribute a distinct service in the cultivation of soil.

Only to a very small extent is the horse a factor in transportation. It is used only for occasional trips of short distance. Since King ibn-Saud has outlawed the ancient Arabian practice of raiding, the chief use of the noble Arab horse has been limited to the national sport of racing.

Though an upstart means of transportation, the automobile ranks only second to the camel in importance. First introduced in 1925, it is represented today by a large tonnage, with many passengers conveyed by car and truck. Back in 1931, the Government busses, cars and drivers were inspected by an able young British engineer, Cyril Ousman. Thanks to his training, the work is now performed by Saudi Arabian officers.

The greatest travel is between Jidda and Mecca, a distance of 46 miles, on a road well laid-out by Egyptian Government engineers, with an excellent stone foundation and asphalt surface. The road from Mecca to Taif and Riyadh, which attracts the next heaviest travel, has a natural surface and is

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subject to many washouts. The grades are not bad, and the same general routes could be followed in constructing a more permanent type of road, but realignments such as the projected detour between Muwai and Afif and Sharia via Wadi Muhrrm would be beneficial.

The road from Riyadh to Jubail, and thence to Qatif, Dhahran and other points along the Persian Gulf, passes through stretches of difficult terrain. In the section stretching for a distance of 50 miles across the Dahna and 70 miles between Hinnot and Jubail, a type of asphalt "mix-in-place" might offer the best solution to the road problem. But the present route followed is far to the south, passing through al-Kharj, Hofuf and Abqaiq. The sands on this route would be subject to the same "mix-in-place" construction. This variety of road was constructed across the Sinai Peninsula under the direction of the Shell Company engineers.

From Jubail to Dhahran, the Arabian American Oil Company has made many excellent oil-surfaced roads—the best in Arabia. From Jidda to Mahad Dhahab Mine, a distance of 246 miles, the Saudi Arabian Mining Syndicate, Ltd., constructed a gravel-surfaced road, of a maximum grade that is 7.5 to 8 per cent, with a 50-foot minimum radius of curvature, over which 15-ton White trucks with 8-ton four-wheeled trailers travel satisfactorily. These are the largest capacity trucks in regular usage. The usual type of truck which is employed by the oil company varies in tonnage between 10, 5 and 1.5 tons, but for special heavy service 15- to 20-ton crawler tread trailers are used. These are hauled by Caterpillar tractors. By far the greatest number of trucks and cars in the country are owned, however, by the Government, which has a considerable fleet of army-type trucks; some are semi-armored and fitted with machine-gun mountings.

The various makes of American cars are represented in the country, with the ubiquitous Ford in the ascendancy, largely

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due to the fact that H. St. John B. Philby had the motor-car monopoly of the country for nearly ten years. Functioning under adverse conditions of climate and road, oftentimes without adequate care, these cars have reflected credit upon the sturdiness of the American automobile. The oil and mining companies have rendered through their personnel and engineers invaluable assistance to the Government Transport Department, and the Government has in return provided the companies with fuel, lubricants, tires and other supplies in cases of emergency.

King ibn-Saud has long recognized the need for more and better roads. In 1939 he requested me to investigate the possibility of motor roads to connect Jizan with Abha, and Abha with Najran. Not till 1940 was the trip made and the reports drawn up, advising that roads were found practicable in both cases. As the matter now stands, grades and curves on the Abha-Najran road have been laid out and marked. In the case of the main route from the Red Sea to the Persian Gulf it would be more practical at the beginning to construct only gravel-surfaced highways, except for the 40 miles across the Nafud, the 50 across Dahna and the 70 across the Hinnot-Jubail sands, or those of Hofuf and Abqaiq where "mix-in-place" or similar oiled surfaces are suggested. The curves and grades should be carefully laid out, and a minimum width of 23 feet, or 7 meters, would make the passage of the largest trucks safe. The following list of proposed roads, with distances reminding one of the tremendous size of the country, might be considered for future construction:

FROM	ELEV.	TO	ELEV.	DISTANCE	
				KILOM.	MILES
1. Abha	7,000 ft.	Jizan	Sea	283	175
2. Abha	7,000	Najran	4,000 ft.	317	196
3. Jidda	Sea	Jizan	Sea	850	527
4. Jidda	Sea	Medina	Approx. 2,000	386	239
5. Mecca	1,200	Riyadh	1,750	967	600
		(via Taif at 5,100)			
6. Riyadh	1,750	Jubail	2,200	524	325
		(via Thamana)		3,326	2,062

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The Jidda-Mecca road is considered adequate and will serve for the present. That from Medina to Hail, and thence to Baghdad, as well as the Hail-Sikaka-Jauf road, requires investigation and subsequent construction should traffic warrant the undertaking. Also, a road from Medina to Transjordan, parallel to, or using the present railway bed, deserves consideration. As a service to the pilgrims hailing from Transjordan, Palestine, Syria, Iran, Kurdistan, Afghanistan and points east, a road connecting the Iraq-Palestine highway, now under construction, with Medina and Mecca, would be highly advisable. Another road, promising to become an artery of inland and international commerce, would be one that ran from Yenbo to Mesajeed and Medina, and another from Yenbo to Umluj, Wejh, Duba, Muwailih and Aqaba, whence it would join the routes leading to Egypt, Transjordan and Palestine. The opening of these new routes might increase the national income not only insofar as pilgrims and other travelers are concerned, but, to an even unexpected degree, through the attraction of tourists from America and Europe. Offered fair roads with adequate rest houses and accommodations, many motorists would undoubtedly be eager to travel through the hitherto remote lands of Hijaz and Asir.

7. Vital Centers of National Life

MECCA

BIRTHPLACE of the Prophet Muhammad and home of the exalted Ka'ba, the destination of pilgrims from all parts of the Moslem world, Mecca is the first city of Hijaz and Saudi Arabia. It lies at an elevation of about 1,400 feet and is 46 miles from the seaport of Jidda, an excellent asphalt road connecting the two cities. Like the hub of a wheel, its roads and trails radiate in all directions, although the only main highway is the one which passes from Jidda through the city, then proceeds easterly to Taif and Riyadh. Stone monuments—called in Arabic *alamat* (signs)—mark the limits of the Holy City beyond which non-Moslems may not go. Western travelers, Burton, Rutter and Hurgonje, to name the three best known, have left us reliable descriptions of the Holy City, which need not be repeated here. The estimated population of 80,000 is doubled, if not tripled, during the pilgrimage season. Encompassed by rocky hills and subjected to intense summer heat, however, during the months of April to October the city which functions as the capital of Hijaz loses many of her leading citizens to Taif in the east, which serves as temporary capital of the province in the six hot months of the year.

Gravely concerned with the matter of water supply, which depends almost entirely upon Ain Zubaida about nine miles away, the Egyptian Government—the richest Moslem state—sought to find a solution to the problem and went as far as to send a staff of engineers, some years ago, who made a thorough study of the situation, incorporating a specific proposal in their final report. When in residence at the Holy City, the King sends for his drinking water to a well several

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miles away known as Bir Joraina, at an elevation of 1,350 feet, where the freshest water of the neighborhood is found. Upon my suggestion, hand pumps were installed here and a cover was placed on the well to prevent contamination as the herds and sheep were watered. Considering the process of pumping too slow and onerous, however, the Bedouins broke the pumps and cast aside the cover. Resort might in the future be made to a small gas engine to operate the pumps, discharging into an elevated tank furnished with suitable valves.

MEDINA

The burial place of Muhammad and scene of his temporal power, Medina is the second sacred city of the country and the Islamic world, wherein the entry of non-Moslems is also prohibited. It lies at an elevation of about 2,000 feet above the sea, is 239 miles north of Jidda, and has an estimated population of 30,000. Within the enclosure of its historic mosque stands the tomb of Muhammad. Noted for its beauty and simplicity, this mosque, the first sanctuary in Islam, was built by the Prophet upon his arrival from Mecca in July 622. Tradition has it that he let his camel wander unguided, despite many invitations to alight, until it finally stopped and knelt at the site which the Prophet forthwith designated for a house of worship. The original and ancient name of the city, Yathrib, was changed subsequent to his arrival therein to Madinat-al-Nabi (City of the Prophet), whence comes "Medina." Plentiful water permits cultivation of abundant fruits and vegetables, exceeding local need, but the inadequate transportation system offers little extension to the limited market. With the construction of good roads and the development of more mines, the prosperity of Medina will doubtlessly increase, its export of dates will be multiplied and its general welfare will be advanced.

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TAIF

Delightfully situated at an elevation of 5,100 feet above the sea, Taif has an estimated population of 5,000 and is the summer capital of Hijaz where the Viceroy, Prince Faisal, ordinarily resides from April to October. He has a thriving farm at Howiya, 11 miles north of the city, where oranges, grapefruit, lemons, citrons, pears and peaches are raised. Large fields of alfalfa and other grains are cultivated in the small farms and fields surrounding Taif. Many delicious grapes are shipped by camel to Mecca and Jidda. The large area tributary to this city gives it the economic advantage of a large market. Its products include the characteristic woolen *beedis*; as well as woven wool and goat-hair rugs and carpets. The water supply is derived from wells and one fine spring.

The city boasts a comfortable, orderly, Government-operated hotel. A telephone exchange connects all Government offices as well as many private houses. Its buildings are stone-granite, largely quarried in a spot to the southwest of the city. Of these the most remarkable is Shubra Palace, half a mile outside the city wall, built by the Turks when they ruled Hijaz. It consists of three floors, with spacious chambers about 16 feet high, and is surrounded by orchards. In the suburbs, smaller stone houses are beginning to rise, indicating an increase in the number of people from Mecca, Jidda and elsewhere who seek this place as a summer resort.

Taif is recognized as one of the oldest cities in Hijaz; there the Prophet sojourned for some time. Of its several mosques, the largest is one at which the Prophet is thought to have worshiped once, although he had not been cordially received in the city from the beginning. A certain degree of sanctity attaches to the name of Taif today and non-Moslems are admitted only by special permission from the highest political authority.

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JIDDA

The main Red Sea seaport of Saudi Arabia, Jidda has an estimated population of 30,000, is 190 miles from Port Sudan and 711 miles from Suez. Much of the drinking water supply is obtained by condensing sea water in a plant that has a daily capacity of 150 tons. The desire of the Government for a more adequate supply may be met if the water resources of the springs above Hadda, up the Wadi Fatimah, are tapped by the use of a conduit or pipeline approximately 34 miles in length.

Jidda is a walled city; the gate facing south is called the Yaman, the one facing towards the Holy City is the Mecca Gate, and that facing north is the Medina Gate. The oil company offices and all the legations are located along the waterfront between the Medina Gate and the customs quay and post office. The terminal of the mining company, a mile and a half north from the Medina Gate, encloses the housing quarters of the staff and transients of the company, and the garages, workshops, power plant, two fuel oil tanks, storehouses and a powder magazine. A telephone exchange connects the main public and private establishments in the city. In the southern outskirts there is a walled cemetery for non-Moslems, whereas that of the Moslems is towards the east. A mile southeast is the new palace called Kazam, to the south of which spreads out the village of Nazla. Northeast of the city is the government guest house, called Khundra, to the east of which is the large hangar and air field.

The customs offices, storehouses and quay lie at the edge of filled ground, but the water depth of the quay is only about 4 feet, and heavy lifts are landed at the pier of the Saudi Arabian Mining Syndicate, Ltd., where large packages up to 15 tons are handled by engine-operated crane. The Arab

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owned and manned dhows, powered by sail only, bring cargoes from the steamers to shore. In the two available "Outer" and "Inner" harbors ships of a maximum draft of 35 and 25 feet respectively may anchor, the latter harbor normally being used by the regular Red Sea lines of British and Italian ships. Tankers servicing the mining company go into a basin accommodating a 17-foot draft at 700 feet off the company pier, and a 6-inch floating pipeline links the tanker with the fixed 8-inch line on the pier. The Arabian American Oil Company installed a 6-inch pipeline, parallel to the 8-inch line, extending as a submarine line to suitable tanker anchorage, and connecting with the floating-top, 6,000-ton gasoline tank adjoining the mining company compound. All installation except that of the mining company is entirely owned by the Saudi Arabian Government, and is under the control of the Director of Mines and Public Works, a section of the Ministry of Finance. The anchorage of the mining company basin is provided with leading marks or beacons, and the approaches to the harbor, as well as the channel to the mining company basin, are marked by buoys and unlighted beacons, using markings prescribed by the International System of Buoyage. I installed these buoys at the request of the Saudi Arabian Government in 1936-1937. Further aids to navigation are authorized by the Government and purchase and construction are under way. The harbor equipment is directly under the Coast Guard Department, subject to the orders of the Governor of Jidda in some cases, but under the Minister of Finance.

YENBO

With an estimated population of 10,000, Yenbo ranks next to Jidda as an important seaport of Hijaz, possessing a well protected and deep, though small, harbor, and a wireless

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telegraph station. Derived from condensed sea water and water impounded in cisterns, the drinking supply would be improved if the reported fresh supply, 26 miles distant, proved attainable. Like most of the country's political administrators, the Governor of Yenbo is a man from Najd, Amir ibn-Isa. He is assisted by a Director of Finance, a Chief of Customs and a leader of religious matters.

Yenbo is the port of Medina, but the 131-mile-long road joining the two cities is far from being a motor highway, and trucks can only carry part load over it. Easterly from the city are the numerous villages dotting the Wadi Yenbo (better known as Yenbo Nakhl, "Yenbo of the palm groves"). Farther up are the Wadi Ais with date groves and villages, and the Wadi Jizal, with the ancient remains of a vanished civilization and agricultural activity. Only a very few nomads are seen today roaming the Wadi Jizal, and there are no fixed habitations. North from Yenbo is the small fishing village of Umluj, then the port of Wejh at a distance of 186 miles.

WEJH

Picturesquely situated on a bluff facing the sea, Wejh has a population estimated at 2,000, and a harbor of deep water which, however, is only large enough for the 1500-ton ships of the Khedivial Mail Line. As at other ports, the cargoes are lightered between ship and shore. The roof of the Governor's house has a commanding view, and the edifice was immortalized by T. E. Lawrence who set up headquarters in it during the Arab campaign in World War I. The water supply is derived from wells a mile inland. About 9 miles to the east are the ancient mines of Umm Garayat, worked by King David, according to the accounts of antiquity. The Saudi Arabian Mining Syndicate gave serious thought to the possibility of reopening the ancient mines in this region but,

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after diamond drilling and careful sampling, it was proven that there was nothing of sufficient size and value here to justify the necessary investment. For examining the northern part of the Hijaz, the company decided to use Wejh as one of its airplane bases, and a satisfactory flying field was cleared. This was used during the two years of prospecting the mines concession.

A few miles to the east, an Egyptian fortress—one of the series of forts that have been built on the pilgrims' route at intervals of twenty to thirty miles—rises with its cut-stone buildings of medieval architecture, flanking towers, battlements, rooms along the walls and central courtyard refreshed by a well. In the days preceding the Saudi regime, pilgrims in Saudi Arabia were at the mercy of highway robbers and could buy protection from the local shaikhs only at an exorbitant price. Hence, the deep concern of Egypt for the safety of her citizens traveling with the pilgrim caravans between Suez and Mecca led to the establishment of these fortresses (sing. *qal'ah*) for their protection.

ABHA

The beautifully situated city of Abha, with an approximate population of 15,000, is the capital of Asir province. It stands at an elevation of 7,000 feet above sea level, a basin surrounded by terraced fields and villages, with mountains rising to a height of 9,000 feet in the haze of the west and northwest. A rainfall of 10 to 12 inches causes the mountain slopes to be covered with a carpet of green vegetation; some of the fields are cultivated without the need for irrigation. The Wadi Abha, a small stream carrying several floods each year, flows through the northern side of the city.

The Governor of Asir, al-Amir Turki Sidari, is eager to increase the prosperity of his province. To that end, he is

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anxious to advance to construction of good roads and to further agricultural activity. He invited me to investigate the possibility of a dam to store flood waters of the Wadi Abha, and, with A. L. Wathen of the U.S. Agricultural Mission, I suggested in 1942 a suitable location for the dam, pending further action by the Government.

The buildings of Abha are of the stone and mud brick multiple-eave variety, typical of Asir, with the exception of the fortresslike Governor's offices, residence and barracks, which are entirely of stone. There are flat roofs everywhere. Two well-built stone-arched bridges cross the Wadi Abha.

Most of the hills and mountain tops surrounding Abha are crowned by stone fortresses built by the Turks. Under the rule of ibn-Saud, all but one of these forts are empty today; the one remaining in use commands the main route up from the Tihama plains, as well as Abha and the road to Abha coming from Khamis Mushait to the east.

JIZAN

The capital of the Tihama region of Asir, and one-time seaport of the Idrisids, Jizan is located atop a promontory which the encircling high tides sometimes turn into a veritable island. A stone fortress rises on the most commanding hillock to a height of 100 feet above water. The Governor's residence is also made of stone, as are nearly half of the town's habitations, whereas the rest are of the straw-roofed, wooden frame type. The fire hazard incurred by the highly inflammable straw-covered houses has moved the Governor, al-Amir Khalid Sidari, to stipulate that hereafter none but stone buildings may be erected.

There is a considerable export-import business between the Yaman and the seaports along the Jizan coast. The shipwrights are extremely adept in the building and repair of

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dhows, using, as previously observed, the natural bend of timber to produce a seaworthy ship. In an open pit near the south edge of Jizan, another industry, the extraction of rock salt, thrives. Suggested improvements, involving the employment of modern methods for stripping and mining the salt, now await the finding of capital and markets. In view of its extensive commercial connections with the hamlets of the Farasan Islands in the west, with abu-Arish and Hummaya in the southwest, added to its vital contact with the centers of population in Sabya and Tihama, Jizan possesses a background favorable to growth.

KUNFIDA

Two hundred miles south of Jidda is another important seaport of Asir—Kunfida—with a population of 4,000 to 5,000 and a considerable hinterland in the foothills of the Hijaz—Asir mountain wall at a distance varying from 10 to 20 miles due east. Its two-story buildings are flat-roofed, with numerous large windows, and are whitewashed on the exterior and interior. The more modest dwelling places have straw sides and roofs, woven over a heavy wooden frame. The water supply is derived from pits about 2.5 miles inland. As with Abha, the development of Kunfida is considered essential to the general welfare of the entire region.

NAJRAN

The Najran valley is at the southern end of Asir, with the Yaman boundary lying along the mountains just to the south of it. The valley has an average altitude of 4,000 feet and is 27 miles long from its head at the ancient dam, called Mufija, to its emergence from the hills onto the great plains extending eastward to the Empty Quarter. The average width of the valley is about three miles. There are several villages

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in the valley, but life in Najran centers around the Governor's fortresslike headquarters four miles from the head. The offices, the official residence, the barracks, guest and audience rooms and stores are located inside compound walls, as is the wireless station. Just outside, to the east, is the Government hospital.

The Governor's buildings are two stories high, of sun-dried mud "bats," not bricks, a type of construction peculiar to Asir, so far as I have seen. The farmhouses in the valley are surrounded by walled fields of alfalfa, date palms, and so forth, and are four or five stories high. They were originally built for defense against raiders as well as to afford more comfortable sleeping quarters. The livestock occupy the first floor, which serves as a barn; in the second is usually stored the harvested crops.

RIYADH

Situated in Wadi Hanifa at an elevation of 1,700 feet above sea level, Riyadh is the capital of Saudi Arabia and the chief city of Najd. It is dominated by the battlements of its mighty palace, of medieval design, with a reported thousand rooms. The unique crenelations of the palace loom above the flat roofs of the metropolis. In the background, one beholds the rows of houses stretching in every direction, windowless on the outside, but following an identical pattern of structure and decorative art within. The inevitable central courtyard presumably represents an originally Najdi house plan, carried by the Arabs into Spain, and therefrom introduced by the Iberians into the New World where it persists in different forms, notably in the patio models of Mexico and the Pacific coast of the United States. Deprived of the stately minaret, a hallmark of Islamic civilization despised by the fanatical Wahhabis as an ungodly development in sacred architecture,

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the city as viewed from the palace roof fails to give the impression of an imposing character. The muezzins take their position on low rectangular minarets where they call the believers to prayer five times a day.

Close to the two-story palace, a power plant and communications center have been established, enabling the King to keep in close contact with all parts of the realm by means of radio, telephone and telegraph. A spacious garage houses hundreds of cars and trucks comprising a part of the royal fleet of motor vehicles. Whenever the King sets out on a pilgrimage to Mecca, over five hundred vehicles follow in his train. Outside the city walls towards the north is the Maruba Palace, where the King's audiences and state dinners are tendered in great chambers and commodious halls. Here, also, Crown Prince Saud holds court, although his official residence is 3 miles westward at Badia Palace, a royal mansion adjoined by palm groves and orchards and recently provided with a swimming pool. A special wing has been reserved here for the entertainment of distinguished guests. An electric elevator has been installed at Maruba Palace for the convenience of the King in moving from floor to floor, and up to the roof.

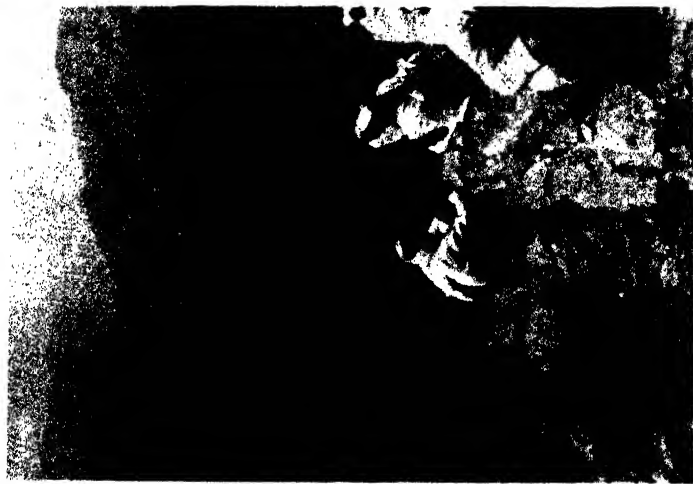
While conceding the holy character of Hijaz, as the cradle of Islam, the people of Najd, aware of their constitutive role in Arab history, ascribe to their native soil a position of honor and sanctity that makes it co-equal with the homeland of the Prophet. Riyadh, though sharing in the crowding of most Arabian centers of population, draws attention to itself, over and above considerations of political supremacy, as the seat of theological learning, and arrogates to itself the right thereby to play a normative role in the religious thought and life of the country. Militating against this natural ambition, however, is the insular quality and aloofness of her citizens,

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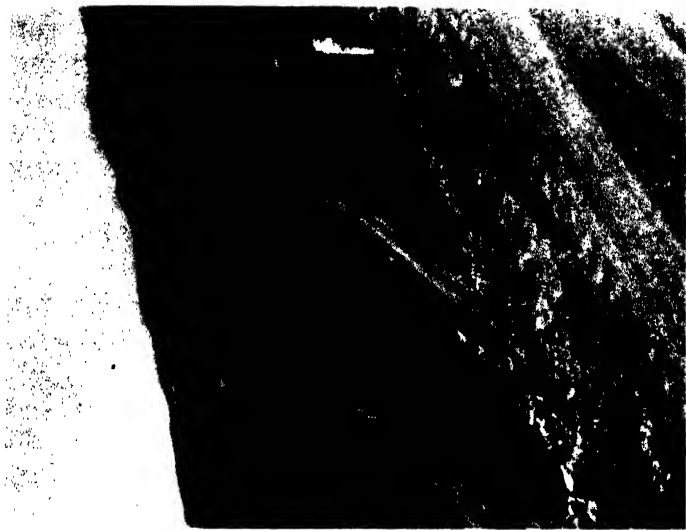
and their innocence of warmth to strangers generally. Nevertheless, the city endures the presence of strangers by the thousands at a time, mostly tribesmen who call on the King to receive their annual subsidies. In order to cope with so large a body of transients, the market place has taken on a disproportionately great size for a city of only a reported 60,000 permanent inhabitants.

BURAI DA

A city of about 30,000 inhabitants, Buraida lies in the northern part of Wadi Rumma's left bank. It is especially favored by the salubrity of the climate and by its proximity to the Wadi whose water, though not very fresh to the taste, affords the city an immense means of agricultural development—hence the large-scale cultivation of the palm tree and the growing of many orchards, as well as plantations of tamarisk trees. Buraida is believed to be the world's leading camel market. Indeed it is one of Najd's foremost centers of population, and has acquired, largely due to its focal position in a region of fifty villages, an immeasurable degree of wealth and prosperity, making it an economic asset to the country at large. As one of the busiest and cleanest marts in Najd, Buraida has won notoriety for its wide, though characteristically winding, streets, excelling in this respect even Riyadh itself. The commodious quarters of the Governor are attractively set within the ramparts of the city's fortress which, but for the six unpretentious mosques, forms the chief architectural center of interest. A four-story building of impressive size, the fortress rises in the northeast of the city, has a wall 40 feet high, and is six hundred years old, with a tower nearly 50 feet in diameter from whose top one gets a splendid view of the countryside.



Proposed route for a motor road
in Wadi Dhila, Asir



Marujaba Grade, 100 miles from Jidda, on the road built
by the mining company to Mahad Dhahab

RUWAB SALAK JUNG BAFADUR



A Mecca signpost at the junction of the old Mecca-Medina caravan route and the modern motor route at Jabal Nura, Hijaz



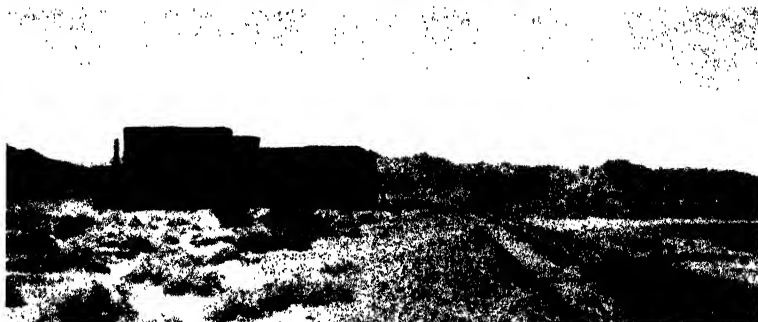
Camel caravan approaching Mecca, 59 days out of Palestine



One of the mining company's 15-ton diesel trucks, en route to Mahad Dhahab from Jidda



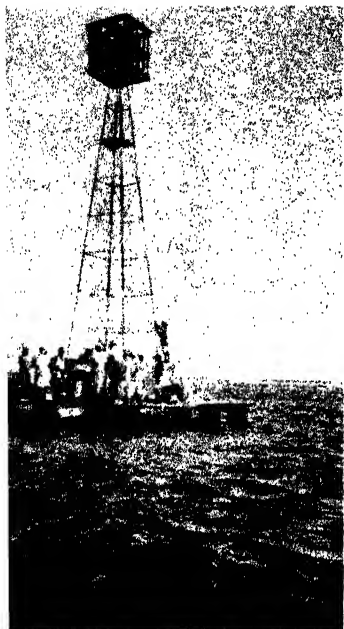
Fortress built by the Egyptians to protect the *Hajj* pilgrims on their journey to Mecca, near Wejh, Hijaz



Typical Hijaz railway station, built by the Turks and out of operation since World War I



A train of the Hijaz railway, wrecked



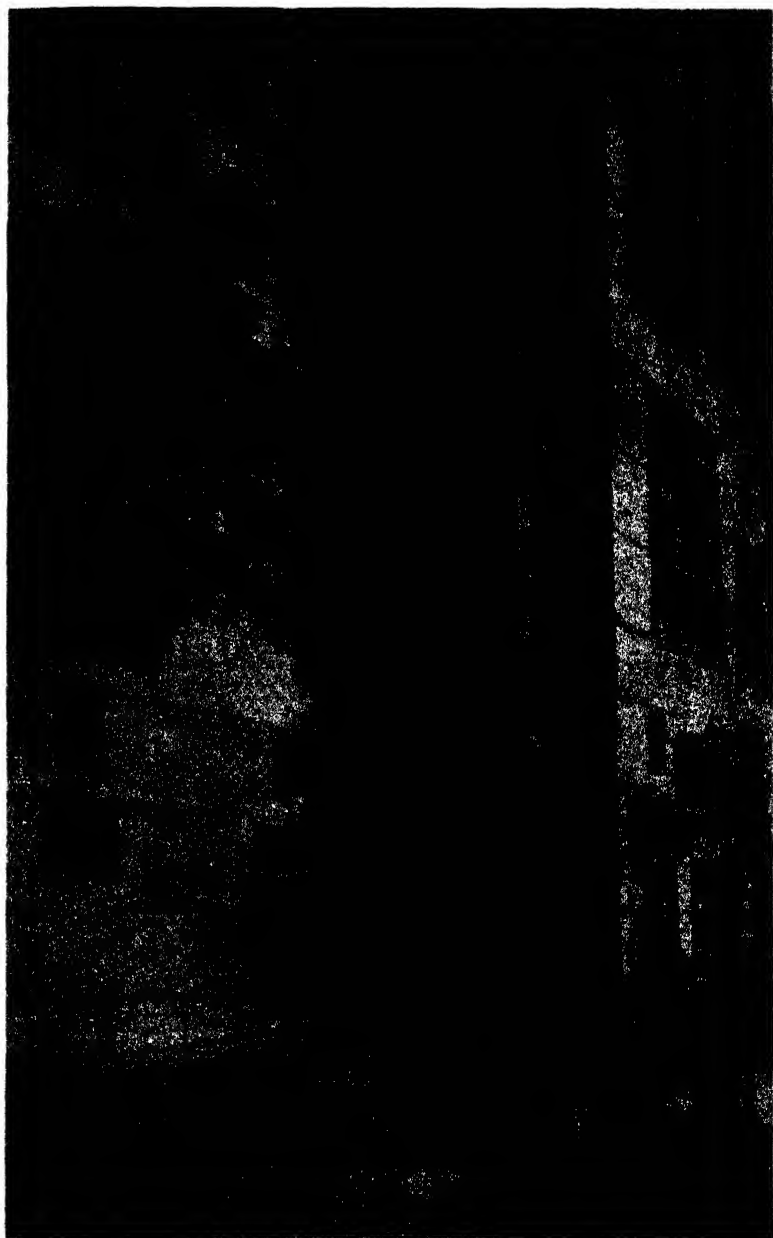
1-foot beacon erected on Mismari Reef
about 12 miles from Jidda



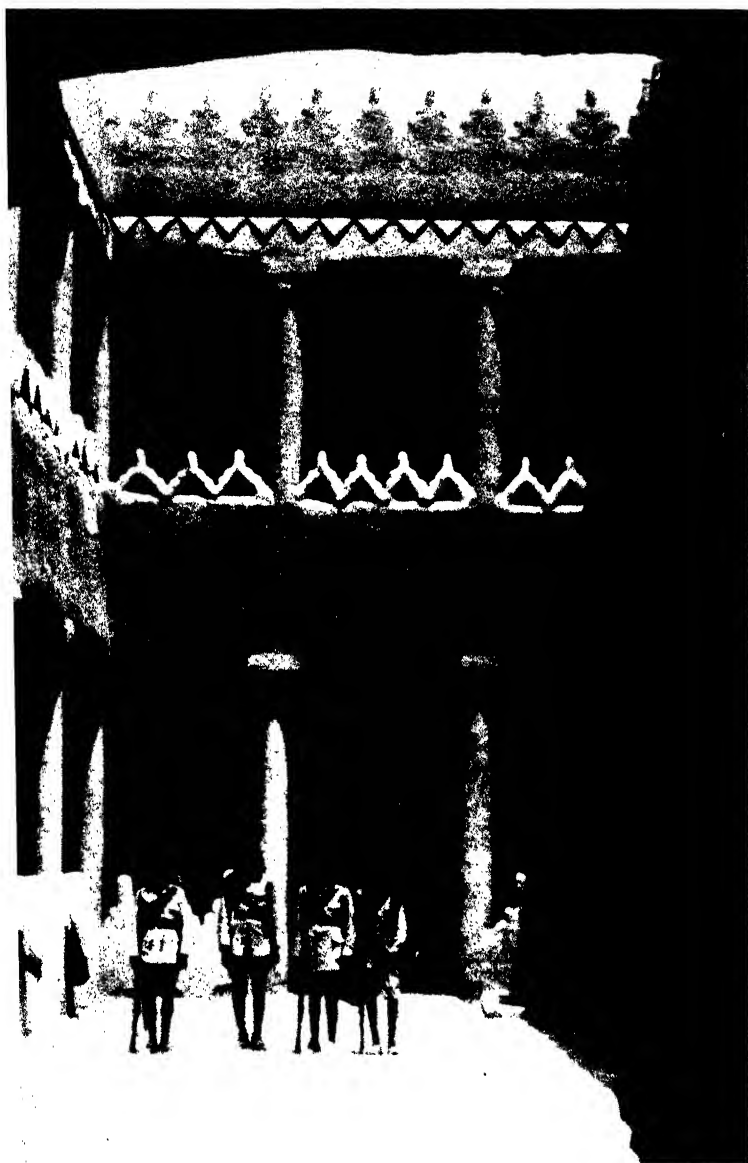
A shipside scene in Jidda harbor



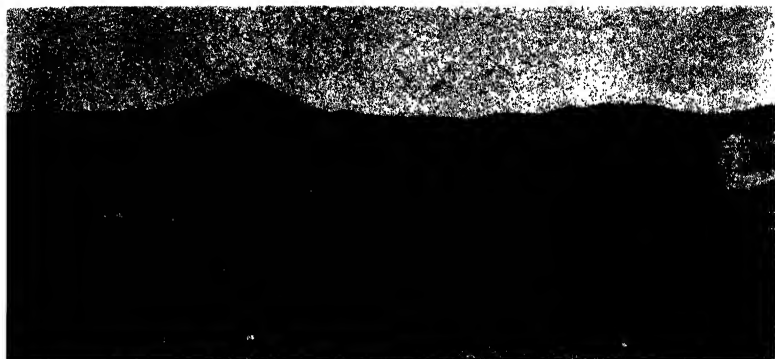
Jidda officials awaiting the return of King Ibn-Saud from his 1945



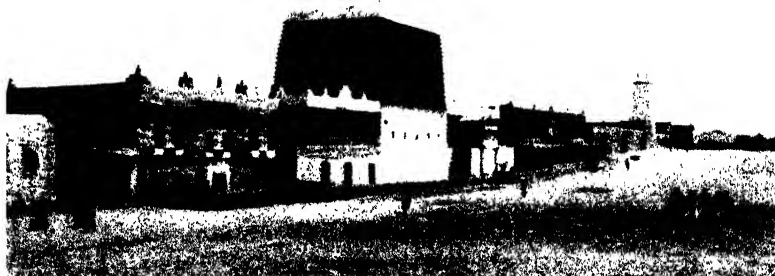
A typical Jidda residence



The courtyard of Badia Palace, near Riyadh, Najd



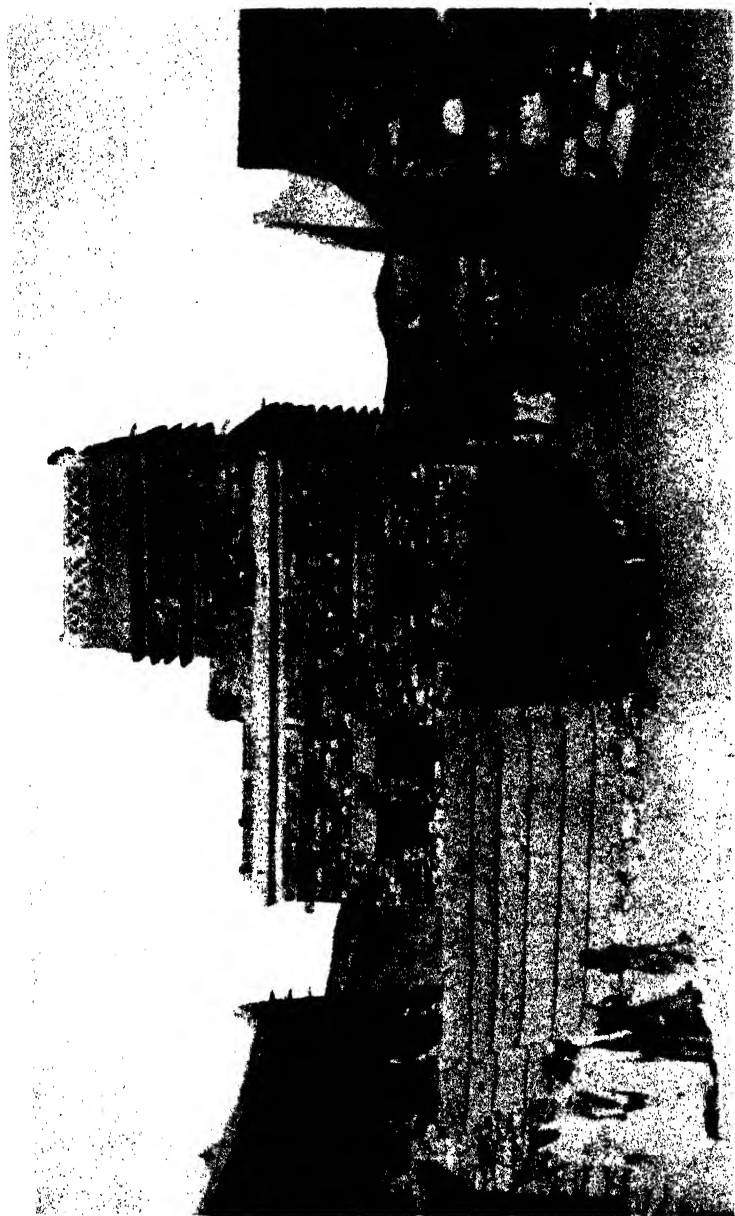
Abha, capital of Asir, from the south



The offices of the Director of Finance at Abha, showing the "multiple cave" construction peculiar to Asir



Dhaharan, between Najran and Abha, in Asir



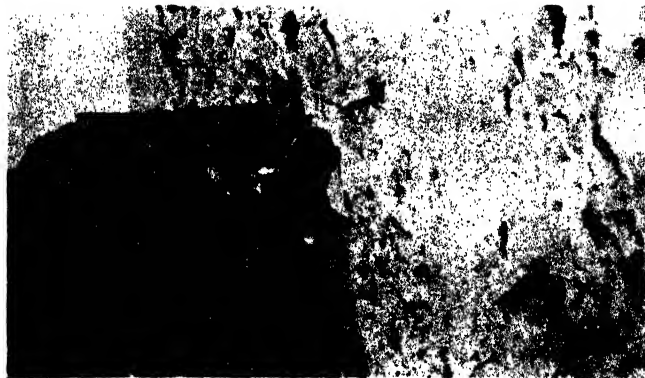
A street scene in Abha



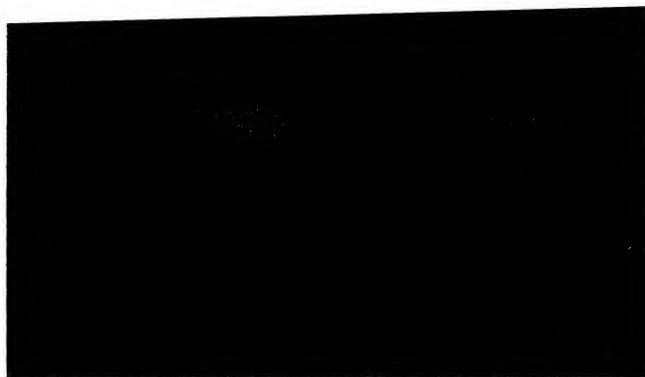
The semi-weekly market in Abha



Mortar found in the Himyaritic ruins at
Dhat al-Oktood, Najran, Asir



The walls of the Himyaritic city



An ancient grinding stone found near
Khamis Mushait in Najran

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ANAIZA

Eighteen miles north from Buraida, on a wadi that is tributary to Rumma, spreads out the city of Anaiza, long a competitor of Buraida. It has been acclaimed as the Paris of Najd, and it is a vital center in the economic life of the province, as a link on the long lines of commercial communication with Egypt, Iraq and India. Moreover, the friendliness and courtesy of the Anaiza folk stands in marked contrast to the proverbial aloofness of Buraida. With an estimated population of 20,000, the city boasts over Buraida, also, its cleaner and more orderly houses of sun-burned mud brick. The streets are generally narrow and crooked, with not even space for a single car to pass through. Gardens are walled in, leaving no open space on either side of the street. Surrounded by sandy plains, beyond the ring of orchards that extend a distance of two miles north, Anaiza must cope with the encroaching desert by a system of dikes and windbreaks of tamarisk trees.

HAIL

Between the twin mountain ranges of Aja and Salma runs the Wadi Uqda, its northern part forming the background of Hail, capital of the defunct Rashids, whose defeat at the hands of the Saudis brought their first city into eclipse. Hail is 280 miles north-east of Medina, at an altitude of 2,800 feet, and has a population of about 10,000. Rising on a slight bluff in the broad valley, the city is protected at the southern end by two fortresses, each built on a separate hill. The larger fortress is about 50 feet above the city, whereas the smaller, Jabal Ayarif, is 90 feet above it. Built of cut-stone and reminiscent of medieval fortifications, these defenses with their battlements and flanking towers are extremely picturesque. Not far from the wireless station, housed in the main fortress,

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appears the Governor's residence on the edge of the city. The water supply is inadequate, since some of it must be hoisted from a depth of 75 feet. It is remarkable, nevertheless, that much cultivation goes on in Hail despite the scarcity of water, proving the observation by U.S. Agricultural experts that far too much water is generally used in irrigation in Saudi Arabia. Dates are the chief crop, but pomegranates, citrus fruits and vegetables are also grown today. The main market street of Hail is unusually broad and a surprisingly large variety of commodities, consisting of local products and imported goods, are normally on sale in the shops and stores.

HOFUF

Capital of Hasa, Hofuf is the seat of the provincial governor, and home of the two wealthy merchant families, the Qusaibis and Ajajis. The oasis of Hofuf is said to have a total population of 150,000, of whom 30,000 live in the city itself. Hofuf is a walled city within which an inner wall encloses the Governor's palace, embracing a mosque, administrative offices, private residences and stables. The formidable inner walls are of sun-dried brick, ringed roundabout by a dry moat. Circular flanking towers are located at numerous points adjacent to the main wall, and a batter imparts greater stability and strength to the entire structure. A product of white limestone erosion, the soil from which the walls and buildings are made dazzles the eye in the intense sunlight.

A marketplace of broad dimensions, with buildings of one, sometimes two, stories, faces the wide street along the moat and wall of the citadel. The numerous narrow and winding streets of the market district are covered for protection against the sun's rays. Of two or three stories as a rule, its houses are marked by flat roofs, commonly used as sleeping quarters.

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The city is growing to such an extent that there are now many shops and small stores outside the main market.

The four Qusaibi brothers, and the Minister of Finance, Shaikh Abdullah Salaiman, have very attractive pavilions in the date groves in Hofuf. The one owned by the Qusaibis is a large structure, located partly over the discharge of their spring, about 75' wide by 85' long, and 20' high to the roof in back. It is open on three sides, facing the garden, and the floor is elevated two or three feet above the ground level, affording a better view of the pomegranates, figs, papayas, and citrus trees growing among the date palms. The back quarter of the building is the usual two stories high; the upper story is used for resting and siestas, while the lower is for bathing. The tepid water from the spring runs through the length of this room, in which there is a long wall serving as a seat along each side to facilitate luxurious bathing.

DHAHRAN

The headquarters of the Arabian American Oil Company, Dhahran is an entirely new town, situated on the hill of that name which rises 300 feet above the Persian Gulf, about 5 miles from the coast. This hill is the "dome" which constitutes the first and one of the greatest oil fields in Saudi Arabia. At present there are 1,200 Americans living there, and the Saudi Arabian villages adjoining to the north and east have about 4,000 inhabitants. The oil company employs 12,000 people on its present operations, which include construction of a 50,000-barrel refinery at Ras Tanura nearby.

Ras Tanura is the main port on the coast for the oil company, and a pipeline conveys oil from the Dhahran dome to the tankers or refinery there. Many supplies have been and still are transshipped at Bahrain Island offshore, but in the

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future use of Ras Tanura will avoid much of the expense which this entails.

Dhahran seems like a bit of the United States transported to Saudi Arabia. Besides its extensive shops, offices and store-houses for the work of the company, it possesses a hospital, moving picture theater—the only one at present in Saudi Arabia—tennis courts, baseball park, golf course, swimming pool and a modern steam laundry. Many of the resident staff members live in air-conditioned houses.

Food for this thriving oil town is largely imported from America, but fish, fresh meat, vegetables and fruit are provided from the company's farming project and from the gardens of the neighboring towns of al-Khobar, Dammam, Qatif and Sofwa. American agricultural methods are used with great success, and are being taught to the Saudi Arabians. Constant communication is maintained between Jidda, the field operations and the Saudi Government by radio, but with Bahrain by motor launch.

QATIF

Qatif, 36 miles northeast of Dhahran, is the the largest market town on the Persian Gulf coast of Saudi Arabia. The amir or Governor of this section of the Hasa has his headquarters here, as do the Director of Finance, and customs and wireless officials. Large fresh water springs irrigate Qatif's thousands of date palms, papayas, citrus fruit trees, rice and alfalfa. The city exports a large quantity of dates and is the chief distributing center for a very extensive area. Much of the business of Hofuf passes through, or is with, Qatif. Its prosperity has been very materially increased by the money brought into the country by the oil company, as has that of the whole region.

A unique type of alfalfa which tolerates a water table of

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only 2 feet below the ground surface has been developed in Qatif gardens. Seeds have been secured by J. G. Hamilton of the 1942 U.S. Agricultural Mission and sent to the U.S. Department of Agriculture in Washington. Some high-water table areas of the United States may be benefited by this type of alfalfa.

DAMMAM AND AL-KHOBAR

These two small and ancient ports on the Persian Gulf are in the vicinity of Dhahran—Dammam 16.5 miles away, and al-Khobar 5.5. Al-Khobar lies just to the north of the new oil company pier from which continuous contact is maintained with Bahrain by fast motor launches and shallow-draft boats.

At Damman an ancient fortress guards a large fresh water spring which provides the village with domestic water. The building may be of Portuguese origin, like that on Darain Island off Qatif. At high tide the spring and fortress are entirely surrounded by the intensely salty water of the Persian Gulf.

There are many truck gardens adjoining the two villages, irrigated by springs and flowing artesian wells. Cultivation is being rapidly increased by drilling. However, the Saudi Government officials were cautioned by the U.S. Agricultural Mission to control the flows from the drilled wells by valves, as artesian water has very definite limits.

8. Architecture and Archeological Remains

ARCHITECTURE

IN A country equivalent in size to a third of the United States, there are bound to be many types of dwellings to meet the needs of a varied climate. Such coastal towns bordering the Red Sea as Jidda, Yenbo, Jizan and Sabya show the influence of Turkish design. The houses rise four to six stories high, and have large rooms, many windows, high ceilings and large verandas. Along the entire coast buildings are of well cut coral, with clay mortar and with wooden ties in the walls. On the flat roofs, commonly partitioned and used for sleeping quarters, one also sometimes finds kitchens and servants' quarters. Among the houses that are free of Turkish influence, the ceilings are lower and the rooms, though well built, are smaller. Plumbing and sanitary fixtures have been only recently introduced. The building example set by the mining and oil companies is being followed by the legations and others.

In southern Tihama, also bordering the Red Sea, the building style is apt to derive from the African conical hut, with a frame constructed of branches skillfully embedded in the ground and interlaced above to form a strong building, averaging about 18 feet in diameter by 20 feet to the apex of the conical roof. The walls are about 9 feet high, and the roof is of coarse grass fastened to the frame by ropes of twisted grass. Both walls and floors of the interior are usually plastered with mud. Fancy woven baskets hang on wooden pegs in the wall for adornment. A group of huts within one enclosure corresponds to the several rooms of a single house. Kiln-baked bricks of soft texture are in some cases used to make one-story houses.

An entirely different type of architecture prevails at Abha,

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the capital of Asir. Here the "multiple eave" style of architecture obtains, unique for its two- or three-story structure and flat roof. The first story is made of stone and the ones above are of sun-dried mud bricks. Protruding layers of schist—a slatelike rock—are built into the mud walls. These are the so-called "multiple eaves," placed in straight lines averaging 19 inches apart. Projecting 17 to 19 inches from the wall surface as a cantilever at a very slight downward inclination, they prevent the rains from running down the wall surface and causing erosion. This seems helpful in an area where an average rainfall of 10 to 12 inches brings many heavy showers. Another architectural form, designed to resist the violent winds, occurs in the lofty mountain regions of 9,000 feet elevation. The buildings have walls entirely of stone. Small doors and windows facilitate heating, a low rectangular enclosure being built at one end of the room where the burning of charcoal provides enough heat and is incidentally used to boil the coffee.

Still another type of building is found in Asir, particularly in the area of 10- to 5-inch rainfall, lying east from the Abha district. With sun-dried mud brick walls, the buildings here are up to five stories tall and have a batter or slope to impart greater stability. A re-entrant corner on the flat roof forms the landlord's open-air sleeping porch. A high mud brick wall usually surrounds each group of buildings, and their external appearance is of a pleasing shape and color. Red mud is utilized as paint for parts of the walls, and also to form frames around the windows. White paint made out of lime is used to outline the top-story windows. An attractive and original style of interior decoration may be observed at Abha—the largest city in Asir's most fertile southern region—and Khamis Mushait. The floor and about three feet up the walls are covered with a light green stain made from the juice of

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alfalfa. Benchlike seats line the walls, equipped with cushions and lozengelike hard pillows forming arm rests and dividers at right angles to the wall. Painted in red, white, blue and black by the women, a decorated wainscot rises above the pillows to an average height of 18 inches. The wainscot decoration consists of geometric designs presenting no curved lines, only lattice work, crosses, squares and angles. In Najran one sees buildings similar in shape and size, but without any interior or exterior decoration.

In Najd the buildings are also of sun-dried mud brick, flat-roofed and seldom more than two stories high, except for occasional towers at one corner of the larger buildings, such as the Governor's residence at Buraida. The customary plan is to build around a central, rectangular, roofless court or patio. The walls extend some 3 to 6 feet above the roof and terminate in characteristic crenelations. Except for the decorations on doors, which are of heavy wood, bearing arabesque designs in red, white, blue and black, there are only the simplest embellishments.

In Hasa, the towers of the Hofuf citadel and outer walls have a batter in a proportion of about one to ten. The buildings are generally two to three stories high, flat roofs being the order save for the few small thatched-roofed buildings. The windows and doors are numerous and spacious. As a rule, the stores, servants' and watermen's quarters are on the ground floor, whereas the master, family and guests occupy the second floor. Geometrical designs are incised in the plaster before it sets, a most attractive type of decoration. Covered with a cheap grade of cotton cloth, the ceilings in many cases bear the words "Made in Japan" stamped in blue dye on the cloth.

Taif has some unique, spacious, stone buildings, including the palace occupied by the Viceroy of Hijaz, Amir Faisal.

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Many were constructed during the Turkish regime and carry the impress of that era. Of excellent stone workmanship and lofty rooms, they are invariably cool during the summer, since the city stands at an altitude of 5,100 feet. Two to four stories in height, these dwellings have plain white interiors with little attempt at ornamentation, but the most recently built homes are showing more color and decoration.

ARCHEOLOGICAL REMAINS

Saudi Arabia contains many traces of former civilizations which would be of keen interest to the archeologist. Of late the Saudi Arabians have come to realize the importance of preserving these relics of antiquity, but little study has been made of them as yet. While not pretending to a survey of the archeological possibilities of the country, I can mention a few of the interesting sites and ruins encountered on my travels.

As noted previously, there are miles of ancient ruins and marks of former cultivation in the Wadi Jizal, northeast of Yenbo. When traveling by plane north from Yenbo, between Umluj and Wadi Hamdh strange circular walls of stone, with a single-line stone wall extending radially from the circle, were to be seen. The circles were judged to be 200 feet in diameter. South from Wejh on the south bank of the Wadi Hamdh are the remains of what seems to be a Roman temple. There are still some steps in place, but the finely carved gypsum stones have been largely used to mark the graves of men killed in a local skirmish.

Along the route north from Medina which follows the line of the old Hijaz Railway, the first station with a village of importance is al-Ula. This town is situated near and among cliffs of yellow and red sandstone, bordering flat wadis. Five and a half miles from al-Ula at Horaiba are the remains of a large settlement, containing some inscriptions and many

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fragments of pottery. In the 60-foot sandstone cliffs adjoining the ruins are many rooms or tombs cut out of the solid rock; in some cases the space is just large enough for one coffin. All the tombs have been opened and robbed, as far as I saw or learned.

Eleven miles from Horaiba, farther north along the railway, is the ancient Nabatean group of tombs called Medain Saleh, described in detail in Doughty's great *Arabia Deserta*. Here there are possibly 20 or 30 tombs cut out of the soft yellow sandstone hills. They vary in size and all have numerous niches to receive coffins. The largest tomb I visited measured 18' 9" by 13'. The roof was 7 feet above the floor which sounded hollow, so there may be an opening beneath. Niches are sometimes as much as 5 feet below the main floor level, and extend 5 or 6 feet into the room walls.

On the exterior of the Medain Saleh tombs, the face of the cliff is cut smooth in a vertical plane; the tomb entrance is a gabled door, usually at least 3 by 7 feet, surrounded by a finely carved casing. In many cases an eagle was carved at the apex of the gable and there was also one at each end in line with the sides of the door. The heads of these eagles, and often the bodies, have been destroyed by the fanatical Wahhabis, who believe that since only Allah can make a living figure, any mortal who tries to depict one is committing sacrilege. Under the apex of some of the doorway gables is carved a flat, round, somewhat grotesque human face which is flanked on either side by a snake lying parallel to the slope of the gable and extending from the apex to the lower corner.

West of Taif, also in Hijaz, a number of angular Kufic inscriptions are to be found. They are mostly Koranic verses and devotional passages in praise of Allah, but there are also several pictures of animals etched into the granite rock. The period of Kufic writing extends in the history of Arabic

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epigraphy from A.D. 720 to 1120. There are many ancient dams, now in disrepair, a few miles southeast to west from Taif, evidence of an evanescent civilization.

Eleven miles southeast of Khamis Mushait, in Asir, and 150 feet above the route to Abha, are the ancient mounds and ruins of Jabal Hamoona. Kiln-burned brick fragments, pieces of slag and fragments of pottery cover quite an area. There are also two large granite grinding wheels, one measuring 4' 9" in diameter and 17" in thickness. These are the type called "Chilian mills," originating in South America and now modified and used in North America, as well as for olive and sesame crushing in eastern Mediterranean countries. There are faint inscriptions on the hard black basic dyke rocks of the mountain, which seem similar to, but more primitive than, the Himyaritic.

In the vicinity of al-Hamdtha on Wadi Tathlith, 183 miles from Najran, Asir, there are abandoned gardens, ruins and gold-mine dumps, showing that there was in ancient times a large settlement here. It is said that the Shammar tribes, now living around Hail and to the north, migrated from this region.

In the Najran valley lies the great ruined city of Dhat al-Okdood, covering an area of 20 acres. The walled area itself contains 12 acres. The present Governor of Najran, Amir Turki ibn-Muthdi, appreciates the archeological significance of Dhat al-Okdood, and he has wisely prohibited any trespassing or random excavating. There are large Chilian mill wheels and a huge mortar to be seen there, besides many fragments of pottery and numerous Himyarite inscriptions. One block of stone measuring 9' 9" by 3' 3" by 2' 1" shows considerable engineering skill, also confirmed by large cut stones in the remnants of the walls.

For many centuries Bedouins and local farmers have been

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carrying away charcoal, bones and other remains from Dhat al-Okdood, spoil which they use as fertilizer. There is a local legend connected with these bones, having to do with a king who ruled Najran at about A.D. 300. His son, Abdullah ibn-Thamir, was converted from idolatry to Christianity, much to his father's anger. The old king tried to kill Abdullah by throwing him into the Wadi Najran to drown, but the son survived. Moreover, he failed to die when his thwarted father tried again by throwing him over a cliff. After the second attempt on his life, Abdullah declared in public audience before the king that he could never be harmed unless his father, too, become a convert. The crafty king pretended to become a Christian and then called his son before him. He struck him lightly on the head with a cane and Abdullah fell down dead. The crowd in the great hall were immensely impressed and all became converted. However, they were so angry at the king for using his power against his son that he became afraid for his life. He had many "large, long trenches" (*ukhdud*) dug, and ordered his soldiers to kill all the converts by throwing them in the trenches, heaping wood upon them and burning them. Thus, says the legend, come the layers of charcoal with bones intermixed at Dhat al-Okdood.

It was reported to me that vessels and trinkets of silver, gold and copper have also been found. It is told that one Bedouin came across a bronze statue of a lion which was too large for any of his camel bags. He solved the difficulty by breaking off the head of the statue and so divided the load to his satisfaction. Amir Turki ibn-Muthdi gave me an alabaster Himyarite head from the ruins.

II. Social and Political Development

9. The Saudi Arabians

POPULATION

THERE are no verified figures on the exact population of Saudi Arabia. In the absence of official census reports, a number of contradictory estimates have been proposed, varying between three and six million. Perhaps one would come reasonably close to the truth of the matter if a figure were struck, halfway between the two extremes, at about four and a half million.

In keeping with the time-honored practice of Arabia, the people know no color line. It may be recalled that Islam's first muezzin was a Negro. Conscious of the fact that, together with the peoples of Europe and America, they are in the main representatives of the Caucasian family, the Arabians designate Americans and English as "red," referring to their ruddy complexion. To be sure, mixed racial strains abound in the country, and many of the inhabitants of the southern Tihama regions may be classified as black, being the descendants of African slaves. But in Najd and among the Bedouins in general, the brown Mediterranean type predominates. The coloring of the townspeople varies from white to light brown, and those with a Syrian strain range from pure white to almost pale. Irrespective of complexion and racial peculiarities, the Saudi Arabian is invariably proud of his family, his tribe, his king, his country and his ancestry.

GOVERNMENT

Though outwardly autocratic in several respects, the government set over the Saudi Arabian peoples is patriarchal and shows certain attributes of democracy. At a given hour of the day, the King makes himself accessible to his subjects. Sitting as a supreme court of appeal, he hears the complaints brought

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before him by even the humblest members of society. A lowly Bedouin may thus appear before the mighty lord of the realm and ask that justice be established in his case. From the King's decision there can be no appeal.

Saudi Arabian law is governed by the Koran, much of which parallels the Mosaic code. Capital punishment is enforced by the ancient form of decapitation by the sword—the penalty for murder. If a man is found guilty of theft, for the first offense the penalty may be amputation of the left hand at the wrist. Eighty lashes of the whip are given for drunkenness. Should a woman be taken in adultery, she is liable to burial to the waist in a pit; stoning to death follows. Adultery, however, is not widespread, partly because of the Koranic injunction that a man may take unto himself as many as four wives, on condition that he cherish them all and provide for them equally.

No considerations of color or pedigree weighs with the King in carrying out his judgments. Usually humane and lenient, he can upon occasion be stern and harsh. Ibn-Saud is regarded, by the consensus of opinion among the people, as a man of wisdom and righteousness. The qualities of justice, generosity and hospitality have added to his fame and popularity.

MANNERS AND CUSTOMS

Arab courtesy and hospitality are proverbial. In former times the protection of a guest was as obligatory as providing him with food and shelter. My first encounter with this code dates back to 1931, the time of my first visit to Saudi Arabia. Accompanied by my wife, I stopped at the Red Sea port of Rabigh where the Chief of Police, Sayyid al-Khurdi, offered us a hospitable dinner. After the meal the two guests were about to depart when Sayyid asked, "In your country how

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many days does the asylum of a guest last?" I was somewhat puzzled, but before I could reply, the host put the query in another form: "How far from you must a guest be before he may be killed?" It was a dark night, and the question did not suggest happy thoughts, especially as we were perhaps the only Americans within a thousand miles. I replied that in our country the protection of a guest lasted indefinitely both as to time and distance, but al-Khurdi seemed to have mental reservations about this answer.

There are innumerable anecdotes about Arabs who gave their last morsel to feed a guest. One story concerns a poor Bedouin shaikh who had endured the loss of his flocks and herds until only one horse was left. A man, who had long coveted the horse and offered to buy him, arrived one day and was invited to stay for a meal. When served, the guest observed an abundance of meat and a scarcity of oats and rice. Having partaken heavily of the food, he tried once more to rescue his host from penury. This time he offered to buy the horse for a much greater price than it was worth. The shaikh listened attentively, then replied, "I thank you for your generosity, but we have just consumed my horse!"

At a Bedouin camp, and elsewhere, one is consistently invited to drink coffee. It is considered discourteous if the usual number of cups is not taken. For each serving, the coffee is roasted, ground with a brass mortar and pestle, and after some seconds of pulverizing, the *gahwaji* (coffee boy) taps the sides of the mortar with the pestle to notify the company that coffee is served. In the case of a European or American traveling in Saudi Arabia, the authorities customarily assign to the foreigner an escort who performs the duties of a coffee boy, rising at an early hour to prepare coffee which he serves at stated intervals till late at night. Generally without handles, coffee cups are two inches in lip

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diameter by two inches in depth, and have small bases. In holding the quarter-to-half full cup, one uses the right hand. Pouring from a brass pot called a *della*, the server passes from one guest to another. Two or three cups are drunk, and unless one shakes the cup from side to side as a gesture that he wishes no more the cup is filled and refilled indefinitely.

On more formal occasions, small cups of heavily sweetened green or black tea are introduced after coffee. Mint is at times added, making a delicious drink. Teacups of about one inch diameter by one and a half inch in depth are used, and it is the proper custom to drink only one cup. Following this, a retainer enters, bearing a small urn containing live charcoal on which a piece of aromatic Indian wood is placed by the host, producing a pungent white smoke. As it is taken around among the guests, the urn is placed by the servant or soldier under the chin of each guest, who holds his shawl around it with two hands, in order to insure a thorough perfuming of his beard. With this pleasant ceremony the party comes to an end and the guests take their leave forthwith.

With few exceptions, the food is placed in receptacles on great mats, or oilcloth, laid on the floor. As previously mentioned, the customary main item in a dinner is the platter of sheep, cooked whole. The meat is surrounded by well cooked rice in which are sometimes raisins. Dishes of chicken, soups, stews, vegetables, fruits and sweetmeats are placed around the main platters, the servants and escort usually acting as attendants and holding bowls of milk—camel's, goat's, or sheep's—which is called *laban hamudh* (sour milk). It is excellent for the digestion and priceless when one has an attack of dysentery. The guests kneel or sit cross-legged at the typical Arab feast. Although there are spoons, most of the food is eaten from one's hand, always the right hand if one observes Arab etiquette. Before as well as after each meal,

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usually inside the dining room, one or more servants hold a brass pitcher of warm water which is poured over the guests' hands into a brass bowl underneath. Another servant holds the towel and soap. Thus are the requirements of cleanliness, stipulated by Arab courtesy and the Moslem religion, fulfilled.

In Hijaz it is customary for the sons of the host, sometimes even the host himself, to wait upon the guests. As a rule in Najd, however, the host sits at the head of the party, with the guest of honor at his right hand. In Asir and Hasa, the host, having received each guest and conversed with him, leads him to the dining hall and sees that he is seated; he then departs and is not seen again till after the meal. In certain instances, the host will take the guest to another room for a brief conversation before leaving, but more generally he is bade farewell directly after he has completed his meal and washed his hands. There are other matters of etiquette strange to a Westerner. When one enters a reception hall, one's shoes are removed whereas one's head remains covered. When sitting on the floor with a group, one should take care that the soles of his feet do not face any of those present, as that would be considered insulting; preferably, one should keep his feet hidden.

It is also a matter of courtesy to wear Saudi Arabian head-dress when traveling outside Jidda, Mahad Dhahab and Dhahran. Formal dress, consisting of a Najdi costume, is required of all who are received in audience at Riyadh by King ibn-Saud. Mr. Alexander Kirk complied with this formality, as did his party of twelve Americans, when in May 1942 he presented his credentials at Riyadh as United States Minister to Saudi Arabia. The wearing of prescribed dress at court is not without precedent elsewhere; up to a few years ago it was obligatory for those presented at the Court of

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St. James in London to wear knee breeches conforming to certain specifications.

An entirely Moslem country, Saudi Arabia observes Friday instead of Sunday as the weekly day of rest. The fasting month of Ramadan, in a broad sense a counterpart to the Christian Lenten period, is a season of abstinence from food and drink during the daylight, unless one happens to be ill or on a journey of more than three days. Strictly observed by the faithful, Ramadan closes in a three-day festival (*'id*) when all municipalities of larger size display their equipment for entertainment. The marked fondness of the typical Arab for children reveals itself at the festivals when every child, even the poorest, tours the amusement area of the town, wearing a new dress and accompanied by the proud father. The very few women who appear at such public gatherings are shrouded from tip to toe, with small slits in their veils for their eyes. The chief attractions for the children are swings, small Ferris wheels and merry-go-rounds, entirely portable equipment made of wood. When one calls on government officials and friends during the festival, coffee and hard candy are served. On departure the guest is sprinkled with rose or other perfumed water.

With an inborn liking for sports, the Arabian takes readily to association football and basketball, although so far these games are chiefly confined to schools. Horse racing, without the extra inducement of betting, is universally popular among all classes, and the Arabian seems to be a natural rider, whether on horse, camel or donkey.

Falconry is still practiced extensively in Najd, and the hawks are carefully trained. On my first trip across Arabia, I visited the camp which the King had established for his favorite sport of hunting, where I was met by an officer carrying a falcon on its perch. Describing the way a hare,

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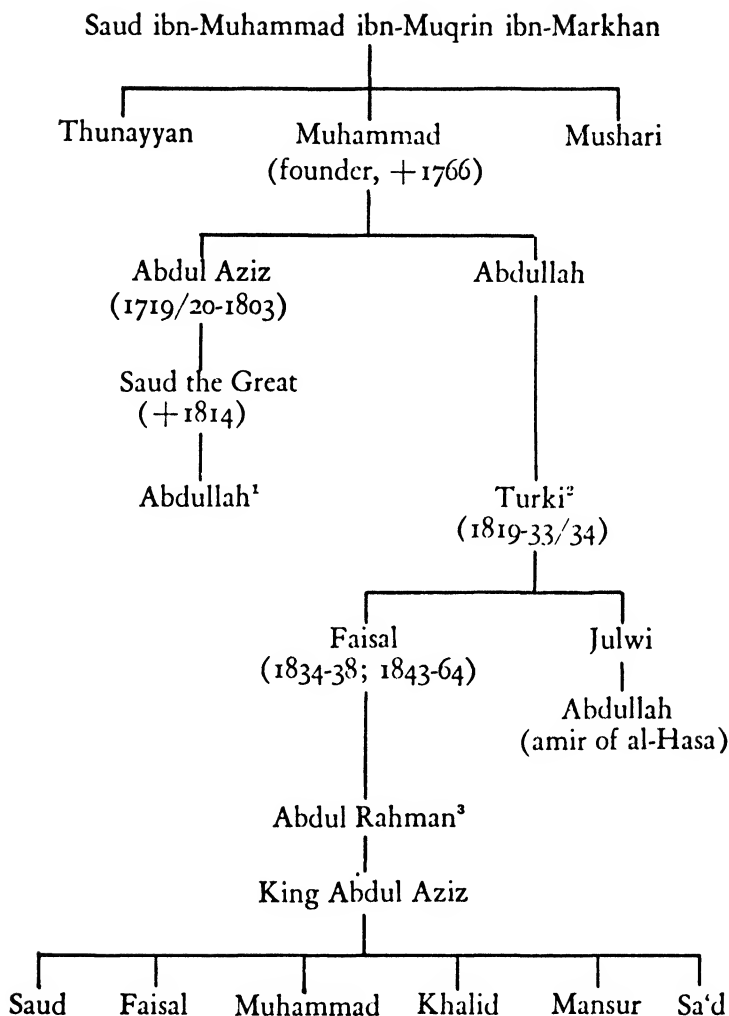
bustard or gazelle is captured, he explained that the falcon alights on the prey's head and overwhelms it by pecking at its eyes. When a lesser bustard was spied stirring in the fields, the Najdi officer proceeded to demonstrate. He removed the little leather hood which covered the falcon's eyes, held up the perch until the bird caught sight of the bustard, whereupon the falcon made a neat take-off and spiraled up some distance. In vain did we watch for the falcon to dive upon the bustard, now quickly vanishing, for he had evidently changed his mind and had decided to regain his freedom, soaring to a height that lost him to sight. Embarrassed beyond words, the officer explained that the falcon was really too young to be trusted, but that surely he would be recovered and receive further training.

10. The House of Saud

IBN-SAUD ranks among the foremost figures of this age. Not since the Arabian Prophet called a nation into being has so much of the Arabian Peninsula been assembled under one man. It is the purpose of this chapter to describe very briefly the beginnings of the House of Saud and the early rise of the present occupant of the throne of Saudi Arabia.

The full name of the King is Abdul Aziz ibn-Abdul Rahman Al Faisal Al Saud. He was born in November 1880 in the palace at Riyadh. To most Arabs he is known simply as Abdul Aziz (servant of the Mighty). His father was Abdul Rahman, the Sultan of Najd; and his mother was Sarah, daughter of Ahmad Sidari, a member of the Dawasir tribe which inhabits a region in the southern parts of Najd towards the Empty Quarter. His ancestor, Saud the Great (+1814), headed the martial and inflexible forces which swept the Arabian Peninsula, proclaiming the puritanical Islamic doctrine of the great reformer Muhammad ibn-Abdul Wahhab, with whose rise in the middle of the eighteenth century the history of the House of Saud is closely related. Saud's military campaigns were finally checked by Tusun, the son of Muhammad Ali, the eminent Viceroy of Egypt.

The Sauds trace their ancestry, in accordance with the genealogical practice of the Arabs, to Bakr ibn-Wa'il ibn-Rabi'ah ibn-Nazar ibn-Ma'add ibn-Adnan. Though vague, and sometimes fictitious, the genealogies of Arabia are not without significance. They rest upon the assumption that an original, now defunct, stock, that of Qahtan, and a more recent one, Adnan, form the two parent stocks of the land. The children of the former grouping—Qahtan—presumably inhabited the south. Theirs was the opulent ancient civilization of the Yaman, Hadramawt and the neighboring coast,



¹ Deposed 1818/19 by Ibrahim Pasha of Egypt, and executed by Turks at Constantinople.

² Founder of Second Saudi state.

³ His two brothers, Abdullah and Saud, contested long, leaving him for a while in partial control.

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that of the Sabaeans and Minaeans. The Adnanites, from whom the Sauds are ultimately descended, constitute the main stock of the north, and, according to tradition, are the offspring of Ishmael whose father Abraham is allegedly the builder of the Ka'bah, ancient Meccan sanctuary. To this northern wing belonged the Mudar, and their kinsmen the Nizarite Quraysh, the forebears of the Prophet.

Out of these ancient roots came the Sauds of modern times, whose House has had a chequered career comprehended in three main periods. First, there was the founder, Muhammad (+1766), petty but ambitious baron of Dar'iyah, who in 1738 gave asylum to the spiritual enthusiast of Uyaynah, Muhammad ibn-Abdul Wahhab, and espoused his religious cause. Muhammad, the founder, was succeeded by his son, Abdul Aziz (1719/20-1803), and his grandson, Saud the Great (+1814). This political structure built by Muhammad and completed by his immediate successors collapsed in 1818 when, defeated on the battlefield by the Egyptian Ibrahim Pasha, Abdullah, the son of Saud the Great, was ignominiously beheaded at Constantinople. Next, there arose Turki, founder of a new Saudi regime, who established his capital at Riyadh. Although he was assassinated in 1834, the state was once more freed of foreign control under his son and successor, Faisal. His latter years were spent in a strenuous effort to keep the peace between his two eldest sons, Abdullah and Saud, and in constant watchfulness to ward off a rival power, that of ibn-Rashid of Hail. While these chaotic conditions wasted the power and prestige of the Sauds, Abdul Rahman, a third son of Faisal, was an exile in Kuwait, accompanied by his son, Abdul Aziz, the present king of Saudi Arabia, and organizer of the third state in the history of the House.

The ambition of Abdul Rahman was to re-establish the

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kingdom of Saud the Great and to make the Wahhabi faith universal. He taught his sons the elements of this religious belief and prescribed a Spartan life, especially for Abdul Aziz, who learned at an early age to use the rifle and perfected the arts of traveling in the desert. In these accomplishments the young prince attained great proficiency, while he never relished the study of books. He rapidly grew to gigantic stature. Of a very energetic and quick-tempered disposition, he was characteristically generous and impulsive. Endowed with a retentive memory, he also possessed an admirable loyalty to friends. But he was not destined long to enjoy the happy, carefree life of a prince. At a very early age, Abdul Aziz—future political architect of Saudi Arabia—was caught in the maelstrom of Peninsular affairs, involving an agonizing struggle with ibn-Rashid of Hail and the Ottoman Turks. On an international scale, he was thrust into direct contact with the Germany of Kaiser Wilhelm II and the Great Britain of the closing Victorian era. In these initial stages of his career, he made a brilliant contribution to the re-establishment of the House of Saud.

Muhammad ibn-Rashid was the ruler of the Shammar tribes, his capital, Hail, being 355 miles northwesterly from Riyadh. Envious of the resources of Riyadh, he sought to annex it, taking advantage of the old rivalry between Abdul Rahman's elder brothers, Abdullah and Saud. Crowned with victory in his siege of the proud city, he installed his own governor, but allowed Abdul Rahman and his family to remain in the palace in deference to the latter's prestige among the Wahhabis. As head of the family of Saud, when his two elder brothers had died, Abdul Rahman could not long endure ibn-Rashid as master, and tried his utmost to arouse the neighboring tribes in behalf of a Saudi restoration. Learning of these machinations, ibn-Rashid instructed his

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agent, Shaikh Salim, Governor of Riyadh, to eliminate Abdul Rahman and the House of Saud. But with characteristic Saudi resourcefulness, Abdul Rahman forestalled the plot by annihilating Salim's bodyguard and making him a prisoner. The townspeople of Riyadh then joined the loyal forces in driving out the representatives of ibn-Rashid. With his superior numbers, ibn-Rashid laid siege to Riyadh and after a period of valiant resistance, Abdul Rahman fled with his household and faithful retainers. He first lived on the bounty of the Ajman tribes of whom Hithlain was the Shaikh, but later decided to take his family into the safety of the remote oasis of Jabrin where the primitive Murra tribes were in control. In this rustic environment, the family of Saud dwelt. Here Abdul Aziz, accompanied by his cousin Abdullah ibn-Julwi, a lifelong friend and supporter, shared the life of the Murra, receiving rigorous training in the Bedouin arts of fighting and survival in the desert. From the Murra he learned the value of mobility and surprise attacks, practiced in raids over immense distances. Restless in this remote abode, Abdul Rahman was happy at last when Shaikh Muhammad, ruler of Kuwait, extended him an invitation to visit his capital on the Persian Gulf.

Ottoman Turkey had long viewed with alarm the growing power of ibn-Rashid. Hafiz Pasha, the Turkish Governor of Hasa, had recognized the value of the House of Saud as the logical opponent to ibn-Rashid and had, therefore, requested Shaikh Muhammad of Kuwait to extend an invitation to Abdul Rahman, promising the Saudis a monthly subsidy as long as they continued to reside in Kuwait. It was an atmosphere in great contrast to that of life among the Murra tribes into which Abdul Aziz was thrown in 1891, when he accompanied his father to Kuwait, largest port on the northwestern side of the Persian Gulf. Through here passed the wares of

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India and the East on their way to Najd, Syria and points west. Less rigorous physically, life here offered him an opportunity to develop his intellectual faculties as he came in contact with men from India, Java and Malaya, as well as from Iran, Iraq, Syria, Turkey and the interior of Arabia. In spite of the comparatively dissolute life of Kuwait he retained his religious piety, and married at the age of fifteen. In 1897, when news was brought that Muhammad ibn-Rashid had died and that the inhabitants of southern Najd would welcome Saudi leadership, he tried to throw off the yoke of the Rashids and to recover Riyadh. However, the tribes did not rally around him and he returned to Kuwait bitterly disappointed.

In the meantime, a series of incidents had materially altered the situation in favor of the House of Saud. In 1897 Mubarak removed his brother Muhammad, Shaikh of Kuwait, by the sword, and gradually became one of the outstanding Arab personalities of his age. Kaiser Wilhelm II of Germany, seeking an outlet on the Persian Gulf for the Berlin-Baghdad Railway, had planned to make Kuwait the eastern terminus. When the Germans failed to drive a bargain with Mubarak they asked the Sultan of Turkey to depose him. Learning of these movements, the British, who for years had concluded treaties with the sultans of the Trucial States, placed the interests of Kuwait under their protection. The Germans countered, acting again through the Ottoman authorities, by urging the Rashids to attack Mubarak. In planning for the defense of his territory, Mubarak sent Abdul Aziz southwest to assault Riyadh as a diversionary measure. Only twenty years old, Prince Abdul Aziz gathered a group of daring men around him, including his intrepid cousin Abdullah ibn-Julwi, who later became Governor of Hasa. Disappointed in his first encounters with the Rashidi forces, he withdrew to

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Jabrin where in a fifty-day conference with his aides he laid down his plan of operations. In 1901 Abdul Aziz entered Riyadh by night. A life and death struggle left him the master of the city, and at the great mosque and in the presence of the religious leaders and notables, he was formally proclaimed by his father, Governor of Najd and Imam (head) of the Wahhabiş.

The successes of the Wahhabi leader worried the Turkish Sultan, Abdul Hamid, who, with German connivance, had formed a dream of pan-Islamic unity, with Arabia—the heart of the Islamic world—under his caliphal jurisdiction. With the support of a Turkish contingent, the Rashidi forces sought to avenge their defeat, but were scattered in battle during the war of 1904. The death of the Rashidi leader, Abdul Aziz ibn-Mut'ib, in 1906 left ibn-Saud master in the home of his forebears. Confusion followed in his rival's camp and, though not without serious problems in his own domain, Abdul Aziz ibn-Saud had by 1907 achieved so great a security for the House of Saud that a new day in Peninsular Arabia was dawning under its aegis.

11. The Rise of the Saudi State

THE period from 1901, when ibn-Saud was proclaimed Governor of Najd and Imam of the Wahhabis, to 1907, when the House of Saud had recovered its former ascendancy, may be described as the restoration. A foundation had thus been laid for the rising Saudi state, a new structure in the society of nations, forged on the anvil of adversity and inner conflict. Adversity was encountered in the changing pattern of contacts with the Turks, the British and the adjoining states. Inner conflict stemmed from the rivalry of the powerful Hashimites, the still burning embers of Rashidi hostility and the proverbial defection of the Bedouins. Through it all, the cementing zeal of the Wahhabi movement, the astute character of ibn-Saud and, perhaps, the readiness of Arabia for a new order are discernible.

In 1908 ibn-Saud learned that an Arab-Turkish official, Husain ibn-Ali of the Hashimite family, had been appointed Sharif of Mecca. This governor claimed jurisdiction over Hijaz, including the abode of the Ataiba tribes on the eastern edge of Hijaz, a region which was under the authority of ibn-Saud. As he was preparing to defend this territory against Husain, word came of a rebellion led by sections of the Ajman and Hazazina tribes, instigated by his cousins, the sons of Saud. Having made peace with Husain, ibn-Saud hurried south where at the village of Hariq he met and defeated the conspirators. He proceeded to Laila, capital of the Aflaj district, where he tried and pronounced death sentences upon the nineteen captured leaders. Having executed eighteen by the sword in public, ibn-Saud pardoned the nineteenth, ordering him to go and inform his friends both of the clemency and stern justice of ibn-Saud. The story of Laila spread with good effect throughout the country.

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During the comparatively peaceful interval up to 1913, ibn-Saud dispensed justice, eradicated raiding and established safety of life and property. While he was stabilizing his realm, his enemies were planning and plotting. Sharif Husain had the ambition of extending his domain; the Young Turks wished to consolidate the Ottoman Empire; Mubarak of Kuwait was filled with envy and jealousy; the Rashidi family wished to regain their former position; and the Germans had not abandoned their aspiration for a port on the Persian Gulf. When the Turks were defeated at Tripoli, they withdrew troops from the Arab world, giving ibn-Saud the opportunity he craved. Resorting to his favorite surprise tactics, he marched on Hofuf with seven hundred picked camel cavalrymen who crossed the moat, scaled the wall, killed the sentries, stormed the main fort and had the Governor captured—all within six hours. From Hofuf ibn-Saud proceeded to the coast of the Persian Gulf, 45 miles to the east. He quickly captured the seaports of Oqair, Dammam, Qatif, Jubail and villages up the coast to Kuwait, appointing his cousin Julwi as Governor of Hasa. Hardly did the Turks have time to bestir themselves when World War I was upon them.

As the gigantic struggle developed between Great Britain and her Allies on the one side, and Germany and the Central Powers on the other, each of the main contestants sought the support of the Arab rulers who controlled the land athwart the strategic line of communications leading to the prize of India and the Far East. These rulers consisted primarily of Husain ibn-Ali, Sharif of Mecca and King of Hijaz; ibn-Saud, Sultan of Najd and Hasa; Mubarak, Shaikh of Kuwait; ibn-Khalifah, Sultan of Bahrain; the Sultan of Muscat; and the Imam Yahia of the Yaman. The British had in 1914 very able representatives in Sir Percy Cox and Captain W. H. I. Shakespeare who made bids for active friendship. It

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soon became clear to ibn-Saud, however, that the British were making terms with Sharif Husain to the west, whereas the Germans, acting through the Turks, had a friendly understanding with the Rashidi and Shammar tribes to the north. With Colonel T. E. Lawrence, Prince Faisal, the eldest and ablest son of Sharif Husain, was fighting the Turks, in return for which Husain was promised a throne from which to rule over all Arabia. Meanwhile the British sent H. St. John B. Philby, accompanied by Lord Belhaven, to visit ibn-Saud and take stock of the situation. Receiving this mission at Riyadh in 1917, ibn-Saud promised to observe neutrality. In view of the British deal with Husain, he could not side actively with the Allies, and devoted himself to the pacification and organization of the Saudi state.

By the spring of 1918, Sharif Husain had become convinced that he had been largely responsible for driving the Turks back northwards and that consequently he was the most important figure in the Near East. He proclaimed himself "King of the Arab Countries," and wrote to ibn-Saud demanding recognition, and asking him to abandon any claim of jurisdiction over the Ataiba tribes. In response, ibn-Saud sent Wahhabi *mutawwa's* (missionaries) to convert the Ataiba to the puritanical faith. Khurma, a town near the edge of Hijaz that had accepted the Wahhabi message, was now attacked by Husain, whose forces, however, were repulsed. Meanwhile the position of Great Britain towards the internal feud of Arabia was inscrutable. The India Office backed the Wahhabi rulers, the Arab Bureau at Cairo gave support to Sharif Husain and the Foreign Office signed treaties with the French regarding matters detrimental both to ibn-Saud and Husain. Ibn-Saud faced the dilemma of honoring his pact of friendship with Britain and at the same time of resisting the ambition of Husain who also was an ally of Britain.

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Ibn-Saud had just crushed the Rashidis, incited to war against him by Husain, when General Allenby captured Damascus and General Marshall took Mosul. Shortly thereafter Ottoman Turkey petitioned for an armistice, and on November 11, 1918, World War I ended with the armistice signed by Germany. Khurma was now attacked by Abdullah, the son of Husain, whose column was scattered by ibn-Saud. Warned by the British, at the appeal of Husain, not to invade Hijaz, ibn-Saud returned to Najd after installing a garrison at Khurma and receiving the fealty of the Ataiba. In the meantime the British continued to favor Husain, following the advice of Colonel Lawrence, and sent Sir Percy Cox to confer with ibn-Saud in 1920. But in the early spring of 1921, the ruler of the Rashids was murdered and his followers were left in utter confusion; then the death of Sultan Salim of Kuwait removed another barrier to the growing aspirations of the Saudi House. Ibn-Saud was able, therefore, to enter Hail, capital of the Rashids in triumph. On his return to Riyadh he was acclaimed as "Sultan of Najd and Its Dependencies."

With the march of events King Husain became increasingly penurious, bombastic and egotistical. He quarreled with the British, demanding that the French relinquish their mandate over Syria and that the Balfour Declaration promising the Jews a national home in Palestine be rescinded. Lawrence was sent to reach an agreement with him but failed. The British tried again without success to reach a reconciliation with him late in 1923. His own subjects plotted against him, and his unpopularity at home and abroad sank to a new level on March 6, 1924, when he proclaimed himself Caliph of Islam, three days after the Turks had abolished the Ottoman Caliphate. Resentment flared up in the Moslem world, and the Wahhabi Arabians were incensed to fury. Having

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received a measure of encouragement from India's Moslems, and with the concurrence of numerous Islamic leaders, ibn-Saud now embarked upon the conquest of Hijaz—Holy Land of Islam—which he ruled as a trust till the inhabitants themselves chose him as their king after the capture of Jidda in December 1925. Husain abdicated on October 5, 1924, and a week after his arrival in Jidda he sailed first to Aqaba, whence in July 1925 he was conveyed by a British warship to Cyprus. There he lived at Nicosia till a few days before his death. In 1926 the inhabitants of Asir—lying between Hijaz and the Yaman—petitioned ibn-Saud for admission as a dependency of Najd. In the same year, at a solemn assembly, over which Abdul Rahman, the venerable father of Abdul Aziz presided, ibn-Saud was asked to be King of Najd, an honor he accepted, without the elaborate ceremony of coronation, in a manner in keeping with the austere practices of the Wahhabis.

On June 6, 1926, at the time of the annual pilgrimage, when an assembly of Moslem delegates from distant parts were considering means for raising the standards of hygiene and social life in the Holy Places, in order to make Hijaz a credit to the name of Islam in the world, an incident occurred which has since cast a shadow over the relations between the two greatest Moslem states—Saudi Arabia and Egypt. In connection with the yearly visit to Hijaz, Egyptians have for centuries brought a litter (*mahmal*), reputedly the same one on which their Queen Shajar-al-Durr rode into Mecca when she performed the pilgrimage in the mid-thirteenth century. Surrounded by an armed escort and to the tunes of a bugle march, the litter was thus paraded through the holy centers of worship. Offensive to the austere Wahhabis, who regarded the *mahmal* as an idol and the musical accompaniment as lurid mockery of the true spirit of Islamic piety, the entire ceremony was denied a place in

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the holy pilgrimage rites. Upon this occasion sharp words led to stone-throwing and ended in shooting. The upshot was that twenty-five persons were killed and many were wounded. But for the personal intervention of Hafiz Wahba, Amir Faisal and the King himself, the Egyptians might have been wiped out. Asked to render an apology, the Egyptian Government balked, and ibn-Saud imposed sanctions strictly prohibiting the armed escort from entering the Hijaz again and suspending the *mahmal* ceremony until 1936. Repercussions in the diplomatic sphere followed inevitably and co-operation between the two countries was seriously hampered until 1940, when the incident was finally closed.

While foreign relations, save the unhappy incident with Egypt just reviewed, were progressing favorably, Russia having been the first to accord King ibn-Saud recognition, followed by Great Britain, France, Germany, Italy and other nations, extremely serious trouble was brewing internally. Duwaish, strong Shaikh of the Mutair tribe, joined by ibn-Hithlain, Shaikh of the Ajman tribes near Kuwait, and Shaikh Bijad, chief of the Ataiba, formed a powerful opposition within the militant Wahhabi community to the policies and practices of ibn-Saud. Acknowledged as the brains of the insurrection, Duwaish rose to challenge the orthodoxy and religious efficacy of the Saudi administration. He denounced the laxity of ibn-Saud, judged by Wahhabi standards, attacking him for taxing the pilgrims, levying a tax on tobacco—a prohibited article—and fostering the use of the telephone, telegraph, radio and motor car—instruments of the Devil. Above all, he deplored the King's intercourse with the "infidel" British and other foreigners, demanding that a holy war (*jihad*) be declared at once against the unbelievers. Most of these doctrinal issues were referred by ibn-Saud to the conclave of divines (*ulama*), while he sought desperately to

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moderate the crisis by resort to diplomacy or the sword as the case required.

This already dangerous condition worsened in 1928. The British, who then held a mandate over Iraq, had found it necessary to employ planes and motorized artillery in quelling the marauding tribesmen of Duwaish, who had violated Iraq territory. Police posts and desert forts had been established on the Iraq-Najd border without ibn-Saud's consent. Military action against the followers of Duwaish necessitated the invasion of Saudi territory, and against his wishes and interests ibn-Saud was brought into direct conflict with the British forces and the government of Iraq. Sir Gilbert Clayton, High Commissioner in Iraq, worked assiduously for a settlement but failed to reach an agreement with ibn-Saud, who vehemently repudiated the right of Iraq to construct fortresslike police stations on the frontier with Najd. Adding to the discomfort of the Saudi House was the attempt of Imam Yahia, King of the Yaman, to drive a wedge between Idrisi, ruler of Asir—a dependency of Najd—and the Saudi throne. With characteristic determination and vision, ibn-Saud seemed to grow stronger as his troubles multiplied. Ever his mainstay, the *Ikhwan* of the Wahhabi faith rallied around him ready to defend the Saudi state. Contingents began to pour in from every quarter until an army of about 15,000 men had been recruited. Again and again, the Saudi forces assailed the recalcitrant Duwaish—the main source of national disorder—until the rebels were crushed, Duwaish captured wounded and his son killed. With Bijad and Duwaish securely interned, and ibn-Hithlain dead, the country began to breathe more easily again. The King of Hijaz, Najd and Its Dependencies, sat on his throne more securely than ever before.

12. Saudi Arabia in the Modern World

IN THE early thirties, despite his growing power, other trials were in store for ibn-Saud. Hasan al-Idrisi, ruler of Asir, persisted, with the encouragement of the Yamanite dynasty and the connivance of Fascist Italy, in an endeavor to secede from his authority. After a period of uneasiness, ibn-Saud took the step in February 1934 of inviting the Imam Yahia, ruler of the Yaman, to meet him at Abha, capital of Asir. Nothing of value was accomplished, and the Yaman reverted to its chronically hostile attitude even after ibn-Saud had dispatched his final appeal and ultimatum. Two Saudi armies, commanded by Crown Prince Saud and Amir Faisal, Viceroy of Hijaz, moved quickly into the Yaman, everywhere defeating Yamanite opposition. While Saud advanced on the plateau through Najran, Faisal proceeded along the Tihama plains down to Hodeidah, the chief port of the Yaman. There the British cruiser "Enterprise" arrived in time to inform the Italian naval forces that Britain was confident in the ability of Faisal and the Saudi Arabians to protect adequately the property and lives of foreigners.

In this fashion the protest with which imperialist Italy had sought to secure a foothold in Arabia was frustrated. Mussolini had long dreamed of acquiring such influence in the Yaman as, in conjunction with the colony of Eritrea, would enable him to dominate the southern end of the Red Sea. With that done he might cut the short route between Britain and India. In seven weeks, however, the war was won and the Imam Yahia sued for peace, sending an emissary to sign the terms at Mecca. Ibn-Saud accorded the Yamanite envoy every honor and courtesy, and received him with great hospitality. Against the counsel of his advisors, the Saudi monarch imposed no indemnity and presented no territorial claims. As

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a result of this far-sighted policy towards a conquered enemy, it would be extremely difficult to arouse Yamanite feeling any more against the Saudi regime.

Negotiations were initiated at this time for the conclusion of friendship pacts with Egypt, Iraq, Iran and the Yaman. Ibn-Saud fostered Pan-Arab understanding along religious, cultural and commercial, but not political, lines. His judgment of British power was astute. Great Britain had recognized him as an independent sovereign, and she had sent a Minister Plenipotentiary and Consul General to his kingdom. Many of the rabid *Ikhwan* still urged him to attack Aqaba and Kuwait but, realizing the value of British protection over these parts, he wisely refused to antagonize the British, although he continued to express his claims through the appropriate diplomatic channels. He wished peace, solemnized in treaties of friendship, with King Faisal of Iraq and his brother Amir Abdullah of Transjordan.

In nearby Palestine a crisis was developing, of vital interest to Ibn-Saud and the world of Islam. Palestine has been an Islamic country from A.D. 635 to 1918 when the Turks were expelled by the victorious Allies. During those centuries, Arabs, Jews and Christians have dwelt together in harmony. In their intercourse with Great Britain, the Arabs had accepted at its face value the pledge of T. E. Lawrence, made in good faith, that there would be a self-governed Pan-Arab state after the victory of the Allies. The mandating of Syria to the French and of Iraq, Palestine and Transjordan to the British brought a widely felt disappointment. Distrust and contempt for the promises of Europeans replaced the former respect that many peoples of the Near East had held for Westerners. Under the Balfour Declaration, 400,000 Jews had settled in Palestine by 1934. With the help of capital provided in Europe and America the Jews bought many of

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the most choice lands of Palestine at high prices. Subsequently the Jewish organization making the purchases stipulated that only Jews might be employed on such lands, and leasing of them was only open to Jews.

Great resentment flared up among the native Arabs of Palestine, leading to bloody outbreaks. British troops did a magnificent job in an attempt to preserve order, but there were riots in Jerusalem and other centers of population. The British Government then took the initiative in calling a conference of "Arab Kings." Iraq, Transjordan, Saudi Arabia and the Yaman were represented. Of the rulers, ibn-Saud was the only one of international importance, a highly influential figure in the Moslem world. He was represented at the conference by his son, Prince Faisal—Viceroy of Hijaz and Minister of Foreign Affairs. Held in Cairo, the conference contributed little towards a solution of the problem posed, though some constructive suggestions were made by the Saudi delegation. Matters drifted along with little change. The British Government, through a statement of policy in 1937 and its White Paper of 1939, brought about a slightly more friendly response from the Arab side.

King Abdul Aziz ibn-Saud has always been intensely concerned with the Palestine problem. He issued a statement conveying his views on the subject, which was published on May 31, 1943, by *Life Magazine*. In no uncertain terms, he stated that he knew of nothing that justified Jewish claims to Palestine as their commonwealth, for the Jews had not ruled it since the Roman period, while the Arabs seized Palestine over a thousand and three hundred years ago. Furthermore, he felt that since the Jews were impelled to seek a place in which to live, there were many places in America and in Europe, more fertile and more spacious, where they might settle without conflict. He also proposed

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that the Arabs guarantee, with the support of the Allies, the interests of the Jews native to Palestine.

The Saudi king feels towards Palestine, I believe, much as most Americans would feel if, say, France or Russia insisted that the United States should receive 100,000 foreign refugees (and subsequently more) into the state of Vermont, which is about the size of Palestine. Palestine, moreover, has at least 40 per cent less arable land than Vermont.

Ibn-Saud remained a steadfast friend to the Allies throughout World War II. During the dark days of 1940, when France fell and Italy entered the war on the side of Germany, he officially maintained strict neutrality and openly declared that he was a friend of Britain and was sure she would not be defeated. Practically all his *Majlis* (council) disagreed and were convinced that Germany would be victorious. The King's judgment was of course vindicated in the end and his already great prestige and reputation for farsightedness and wisdom have been increased.

The influence of ibn-Saud in the Moslem world is undoubtedly unique. His power is derived not only from his rule over Hijaz, the heart of Islam, with its sacred Moslem cities, Mecca and Medina, but also from his record of accomplishment and compelling personality. Had he so desired, he could without any question have directed the Moslems of Egypt, Palestine and Syria to cut British lines of supply and communication to such effect that British troops, sorely needed at al-Alamain, would have had to be diverted for policing. Thus the victory of the Eighth Army, won by a narrow enough margin, would have been seriously endangered. Instead, ibn-Saud sent his son, Amir Mansour, to Egypt before the battle of al-Alamain to speak to the Moslem Indian troops. The

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presence of Mansour was concrete evidence of the friendship of ibn-Saud to the Allies in this military crisis.

In Iraq the Germanophile Gailani gave Britain serious concern, but ibn-Saud frowned upon this rebellion and tried to dissuade Rashid and his followers. Had ibn-Saud encouraged the Iraqi rebels it is quite conceivable that the Germans would have flown many troops to Iraq for the short distance around Turkey and over Syria. Turkey might then have been influenced to become a German ally. With this accomplished, Hitler's forces could have reached the rich oil deposits of Iraq and Iran, and advanced to the Suez Canal to join forces with the Afrika Korps.

The following excerpts from a letter of H. E. Shaikh Hafiz Wahba, Saudi Minister to Great Britain, give evidence of the faith of ibn-Saud in the ultimate victory of the Allies, and show his attempt to discourage the Iraqi rebels at a time when Germany seemed to be winning the war:

"In the first place Syed Rasheed Ali fomented trouble against the British without consulting any of his neighbours. He never consulted even King ibn-Saud, although there is a Treaty between the two countries signed in 1940, which compels both countries to consult one another on any subject relating to any Arab question.

"Perhaps Syed Rasheed thought that his forces could beat the British forces without any help from his neighbours. But after a short time he found out that his army could not stand long against the British, which had unlimited resources. He then sent the late Nagy Pasha Al Sowed, one of his cabinet ministers—whose family, as well as himself, have personal friendly relations with H.M. King Abdul Aziz—to Ryad; but the King told him straight away that they had blundered and made a big mistake in fighting Great Britain at such a critical time, and that any difference of opinion between them-

selves and Great Britain should have been solved by peaceful means. His Majesty told him also that they are indebted to Great Britain for their independence, for Great Britain had conquered Iraq in the last World War but they [the British] found it better, from their own point of view, to grant Iraq her independence.

“His Majesty went on to say to Nagy Pasha—‘In the second place I am a staunch friend of Great Britain, inheriting this friendship from my grandfather, Faisal Ibn-Turki. When a friend is in duress, then, for the sake of friendship, one does not act against him. Personally, if I had sufficient armaments I would have gone to the help of Great Britain and not acted against her. With the exception of the question of Palestine, Great Britain did nothing against the Arab interests and the present war is one of life or death. So our duty is, if not able to help Great Britain, to be neutral. This is the least I can do. I believe that from the very beginning of your insurrection it would be a failure. You also know that, Nagy. For that I advise you to cease hostility against Great Britain and negotiate with her if possible.’

“Naturally, Nagy Pasha defended Sayed Rasheed’s policy and gave his reasons for it, as was his duty as a member of Rasheed’s Cabinet.”

There was another point of danger. India was conducting a disobedience and non-cooperation campaign headed by the Indian Congress, largely Hindu. Had ibn-Saud been pro-Axis, it is possible that many of the ninety million Moslems of India might have actively assisted the Japanese to invade India. The Indian Congress would have been more successful in their policies had they been in a position to count on Moslem co-operation. If the Wahhabi King and leader had preached a holy war or had been actively pro-Axis, the

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Moslems of the northern frontier of India might thereby have been encouraged to welcome the Japanese.

Having declared war on March 1, 1945, against Germany and Japan, Saudi Arabia joined the United Nations' Organization and was represented at the San Francisco World Security Conference. For the kingdom of ibn-Saud this meant wider international recognition and was bound to draw the country into new and closer relations with the rest of the world. The simple dignity of H.R.H. Prince Faisal, his personal grace and alert mind, won him the esteem of the other delegates. As chairman of his country's delegation, Prince Faisal was accompanied by two key figures in Saudi Arabia's diplomatic service: H. E. Shaikh Hafiz Wahba, Minister to Great Britain, and H. E. Asad al-Faqih, then Minister to Iraq and now accredited to the United States. The latter diplomat also served in the capacity of delegate to the United Nations' Committee of Jurists, which met in Washington, D.C., during the month of April 1945.

Furtherance of education and sanitation in Saudi Arabia has stabilized the position of the House of Saud at home. A start was made about 1931 in founding schools and hospitals in the main towns and villages. Except for the excellent schools organized and managed at Mecca and Jidda until the great depression by the Ali Reza Zainal brothers, and the public schools of Jidda, Mecca, Taif and Medina, education was almost exclusively based on the Koran. Ibn-Saud has tried to broaden the Arabian conception of education, and to raise the standards of sanitation, by calling teachers and doctors from neighboring Moslem countries, especially Syria and Egypt. The oil and mining companies have been an asset to the educational and medical resources of the country.

The King has shown great wisdom in initiating the move-

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ment for the settlement of the Bedouin *Ikhwan* in selected areas of Najd and Hasa. He induced preachers to accept life on a farm or in newly constituted villages. Living in fixed homes and cultivating the soil have gone against the grain of Bedouin character, yet the King has successfully carried out the permanent settlement of about one-third of the former nomads under his jurisdiction. Among the successful settlements are those of the Haleet district, northwest of Duwadami; Fowara district, to the southeast of Hail; and Oglat al-Seghur, on the Wadi ar-Rumma to the east of the road between Medina and Hail. Though many of the former Bedouins still despise the pursuit of agriculture, the future prosperity of the land lies along this path.

13. Political Administration

DISTINCTIVE problems of political organization must of necessity arise in a country greater in area than the British Isles, Germany, France and Italy combined. When one bears in mind that Saudi Arabia has previously had little contact with the outside world, practically no experience in modern political administration, and hardly any tradition of self-government on a broad national scale, the rapid strides taken by her administrators towards efficiency and order are little short of miraculous. Within the limited confines of this chapter, some aspects of the governmental structure will be delineated, in order to suggest the nature and operation of the Saudi Arabian system of control.

A preliminary statement might serve to show the present-day trend towards modernization. Ibn-Saud is fully aware of the importance to the progress of the nation of modern military and technical equipment. His Minister of Finance, Abdullah Sulaiman, bought from the Marconi Company fourteen complete wireless stations through the good offices of H. St. John B. Philby, to whom a concession was granted to import Ford cars. Whereas in 1926 there had probably been less than a dozen cars in the entire country, a total of 1,200 was estimated by 1930, the majority owned by the Government and Government-sponsored companies. There are also an appreciable number of private owners. In the period 1927-1930, handsome profits accrued to the automobile owners who offered their services in the transporting of pilgrims between Jidda and Mecca-Medina.

Ibn-Saud organized a small regular army, furnished with modern rifles and machine guns. The force was trained, in the early stages, by former Turkish officers. Shortly after its formation, this military machine was tested on the field of

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battle subduing the rebellion of the Harb tribes south of Mecca. A competent elderly Turk serves as commander of the regular troops.

The Director General of Post and Telegraph has charge of the cable between Jidda and Port Sudan, the telephone and telegraph lines between Jidda, Mecca and Taif, and the numerous wireless stations connecting the important towns and points of the country. The original fourteen Marconi stations have been augmented by the purchase of Collins, RCA and other American radio equipment.

For years ibn-Saud has been air-minded. About 1930, he obtained from the British Government four De Haviland Wapiti biplanes. Flown over to Jidda, they were manned by British personnel for two or three years. Since 1934 three Russians have served as pilots and mechanics, but Saudi Arabians are rapidly filling vacancies in the air force of their country. At present the King has six C-47 planes, including the one presented to him by President Roosevelt. Ibn Saud is intent upon the creation of a small air fleet as soon as conditions permit. Such a development will contribute to the effective exercise by the Government of its authority in ruling and policing the huge domains falling within its jurisdiction.

Considerable additions were made in 1940 to the equipment of the regular Saudi Army. These consisted largely in motor trucks and semiarmored cars, provided with machine-gun mounts and automatic small arms. This form of military power is a further guarantee of the internal stability and perpetuity of the Saudi regime. But the greatest protection against foreign powers is the official recognition of Saudi Arabia as a free and independent nation by the United States and Great Britain. Italy, as we have seen, yearned for the Red Sea side of Arabia. In 1937, Japan, with the encouragement of Germany and Italy, similarly tried to secure a toehold in Najd

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by offering fantastic terms for an oil concession. Without Anglo-American support, similar approaches might recur.

As a nucleus around which the officialdom of the Government has been built, ibn-Saud has largely relied upon his two elder sons and a few other kinsmen, partisans and confidants. While his son, Saud, as Crown Prince, is retained at all times in Najd as his father's immediate assistant, the second son, Faisal, has been appointed Viceroy of Hijaz and Minister of Foreign Affairs. For the important Ministry of Finance, the King's choice fell upon Shaikh Abdullah Sulaiman Al Hamdan of Anaiza, aided by his brother, Hamid. Abdullah Al Fadl, a native of Jidda, was appointed president of the city council in Mecca. Throughout Hijaz, local councils were formed to assist the governors of the five leading towns: Mecca, Medina, Jidda, Yenbo and Taif. In the country as a whole, the governors were largely drawn from the loyal Najdi constituency, aided, however, by the advice of councils of prominent citizens representing the local population. To his assistance ibn-Saud called men of competence and fidelity. He was not limited to men of Najdi nationality but frequently employed upright Moslems of Arab stock regardless of their original country. Some of the highest officials in his Government are from outside Saudi Arabia. Shaikh Hafiz Wahba, Minister to Great Britain and for many years Chief Counselor, is an Egyptian of Najdi ancestry. Yusuf Yaseen, long a Chief Secretary and now (1945-1946) Acting Foreign Minister, is a Syrian from Latakia. Shaikh Fuad Hamza, for several years Acting Minister of Foreign Affairs, then Minister to France and later to Turkey, is a Druze from Lebanon.

INTERNAL ADMINISTRATION

As shown above, the country is politically organized under four major divisions, corresponding to the formerly inde-

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pendent kingdoms which constitute the present Kingdom of Saudi Arabia. Each political division might be visualized as the counterpart to a state in the American Union. The four states are: 1) Najd, the "heart of Arabia," ruled by the Crown Prince Amir Saud, assisting his father; 2) Hijaz, holy land of Islam, under the administration of Viceroy Amir Faisal; 3) Hasa, of which Abdullah ibn-Julwi, cousin of ibn-Saud and champion of the Saudi cause, was the governor until his death a short time ago when his son, Sa'd, succeeded to the rulership of the state; 4) Asir, governed by the nephew of the King, Amir Turki, scion of the powerful and loyal Sidari family.

Each of these rulers has command over considerable military forces which serve as escorts, police and reserves in time of trouble. Under the rulers of the states are the amirs of towns and villages. In all but the smallest administrative units, a Director of Finance works along with the Amir and reports both to him and the Ministry of Finance at Mecca. In the larger towns there may be a member of the *uluma* (theologians) class who will give the Amir counsel in religious matters. Some of the governors have *qadis* (judges) to assist in the trial of criminal cases, as well as in giving legal advice when needed, but in small places the governors act as their own judges.

Under the Ministry of Finance is the Department of Mines and Public Works, created in 1936 to deal with the oil and mine concessions. Aably administered until early 1944 by a Lebanese, Najib Ibrahim Salha, the department then came under the management of Sayyid Izz-al-Din al-Shawa of Jerusalem, member of an old and prominent Palestinian Arab family. Late in 1945, Sayyid Sami Kutbi, who was born in Mecca, took over the position. The political divi-

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sions of the nation are hereunder listed on the authority of Col. Gerald de Gaury, *Saudi Arabia Notebook*, Cairo, 1943:

NAJD (Administered from the capital, Riyadh)

I. *Province of Najd*

- a) Hauta
- b) Hariq
- c) Wadi Dawasir
- d) Washm
- e) Sudair
- f) Mihmal
- g) Khurma, including Turbah and neighboring oases
- h) Bisha
Bedouin divisions attached direct to headquarters of the Najd province
- i) Subai and Suhul
- j) Ataiba
- k) Duwadami, including Sha'ara and numerous Ikhwan settlements
- l) Qahtan
- m) Mutair, with headquarters at Artawiya

II. *Province of Qasim* (Headquarters at Anaiza)

- a) Anaiza
- b) Buraida, including villages along Wadi Ruma
- c) Rass, including Qasr ibn-Uqail, Subaih and Naibaniya

III. *Province of Jabal Shammar* (Headquarters at Hail; Governor—Abdul Aziz ibn-Musa'id)

- a) Hail
- b) Taima
- c) Khaibar
- d) Mutair (*see i-m above, when not attached to Riyadh*)

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HASA (Headquarters at Hofuf; Governor—Sa'd ibn-Abdullah Julwi)

- a) Hofuf, which includes Jash and Mubarraz
- b) Qatif, including Sofwa, Awamia, Dammam, Sinabis, Darain Island, Tarut, Ruffiya, and islands off the Hasa coast near Qatif
- c) Jubail including Ainain
- d) Bedouin divisions of
 - Murra Mutair
 - beni-Hajir Manasir
 - beni-Khalid Awazim
 - Ajman Rashaida

ASIR (Headquarters at Abha; Governor—Turki ibn-Sidari)

- a) Abha
- b) Shahran, including Suk ibn-Mushait or Khamis Mushait
- c) Qahtan
- d) Rijal Al Ma
- e) Najran

District of Asir Tihama (Headquarters at Jizan; Governor—Khalid ibn-Sidari)

- a) Sabya, including Darb and Baish
- b) Jizan
- c) abu-Arish

HIJAZ (Administered by the Viceroy, H.R.H. Amir Faisal; Headquarters at Mecca)

- a) Qariyat al-Milh, including Qaf and Minwa
- b) Jauf (formerly under Jabal Shammar province of Najd and its dependencies, including Sakaka)
- c) Tabuk, with jurisdiction over the bani-Atiya and Huwaitat

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- d) al-Ula with jurisdiction over the Hutaim and wuld-Ali
- e) Duba, with jurisdiction over Tuqaiqat and Hawaitat (Tihama)
- f) Wejh, with jurisdiction over the Billi
- g) Umluj
- h) Yenbo
- i) Medina, with jurisdiction over the greater part of the Harb
- j) Rabigh
- k) Gadhima
- l) Jidda
- m) Mecca
- n) Taif
- o) Ghamid and Zahran
- p) beni-Shehr (headquarters at Numas)
- q) Lith
- r) Kunfida
- s) Birk, with jurisdiction over the beni-Hasan

FOREIGN AFFAIRS

Representing H.R.H. Amir Faisal—Viceroy of Hijaz and Minister of Foreign Affairs—is an Acting Minister of Foreign Affairs stationed at Jidda. This important office has been filled, since 1939, when its former occupant, Fuad Hamza, was sent to Paris as Saudi Arabian Minister, by Shaikh Yusuf Yaseen, a native of Latakia. Shaikh Yusuf Yaseen is now the Under Secretary of State for Foreign Affairs, appointed in 1941. The following is a list of Saudi Arabian legations and representatives abroad:

		<i>Year Appointed</i>
<i>London</i>	H. E., Shaikh Hafiz Wahba, Envoy Extraordinary & Minister Plenipotentiary	1930

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<i>Cairo</i>	H. E., Shaikh Fauzan Al Sabik, Envoy Extraordinary & Minister Plenipotentiary	1926
<i>Turkey</i>	H. E., Fuad Bey Hamza, Envoy Extraordinary & Minister Plenipotentiary	1942
<i>Jerusalem</i>	Shaikh Abdul Aziz al-Qohaymi, Consul	1935
<i>Baghdad</i>	H. E., Shaikh Asaad Al-Fakih, Envoy Extraordinary & Minister Plenipotentiary Abdullah Al-Khayyal, Chargé d'Affaires	1941-1945 1946
<i>Syria</i>	H. E., Abdul Aziz ibn-Zaid, Envoy Extraordinary & Minister Plenipotentiary (previously Consul- General in Damascus)	1944
<i>Basra</i>	Shaikh Fakhry Shaikh al-Ard, Consul	1943
<i>U.S.A.</i>	Washington: H. E., Shaikh Asaad Al-Fakih, Minister	1945

It is often asked what will happen to the Saudi Arabian Government after the founder is gone. In answer one must bear in mind that Crown Prince Saud has been designated by his father as the successor to the throne. Both the *Ulama* (theologians) and the state council have elected Amir Saud, confirming his succession. I have been informed that all his brothers who are of age have sworn allegiance to Amir Saud in case of the death of their father. Judging by personal observation, I believe that insofar as Amir Faisal and the other royal brothers and relations, as well as the overwhelming majority of Saudi Arabians, are concerned, nothing but loyal support will be forthcoming. The present

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governmental organization, with the backing of the well equipped army, would indicate that Amir Saud will have little trouble in carrying on the government which his father founded so ably. Revenues from oil and mines should assist in financing the Government through the coming half-century.

III. The Position of Saudi Arabia in World Economy

14. Contact with the West

DIPLOMATIC-CONSULAR RELATIONS

SAUDI ARABIA has long been a land closed to the Western peoples, principally because it is the heart of Islam. Religious taboos and not inhospitality have prevented free travel in the country, especially in the provinces of Hijaz and Najd. All foreigners require special permission to enter Saudi Arabia, the usual ports of entry being Jidda and in Hasa. Where there are no Saudi Arab representatives, the granting of the visa is deferred until one arrives at Cairo, Baghdad or Bahrain. Here a visa is issued if entry is approved by the Saudi Arabian Government.

Foreign legations and business firms are located at Jidda, except for the operations of the oil and mining companies, whose employees are allowed to go without special government permission beyond the prescribed limits of the city, 60 miles north and south, and 18 miles eastward. The soldier escort provided by the Government for travel outside of these limits is either paid a previously agreed-upon salary, or is given a substantial gratuity. Since life and property are perfectly safe throughout Saudi Arabia today, ibn-Saud having abolished banditry, the function of an escort consists in evidencing the King's approval of a foreigner's presence, and in providing whatever personal aid and guidance may be necessary.

Established in Jidda are Afghan, American, British, Chinese, Dutch, Egyptian, French, Iranian, Iraqi and Turkish legations. The American Legation was established in May 1943. The first full-time resident minister, Colonel William Eddy, was born of missionary parents in Sidon, Syria, has spent many years in Arabic-speaking countries, and made a

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brilliant record in Arabia. In mid-1946 he was succeeded by Mr. James Rives Childs, another able diplomat.

The Saudi Government is kept in touch with the representatives of foreign powers through an Under Secretary for Foreign Affairs, stationed permanently at Jidda. Having conferred with foreign agents, Shaikh Yusuf Yaseen, who has occupied this office since 1941, submits synopses, accompanied by his own views, to H.R.H. Amir Faisal, Secretary of State for Foreign Affairs, who resides in Mecca. The latter informs the King of all major matters and is governed by the views of his father, whose decisions are final.

Amir Faisal comes to Jidda whenever foreign questions demand his presence, or a foreign representative arrives who is of sufficient rank to merit his personal welcome and reception. In that event the Amir resides in Kazam Palace at Nazla, a mile east from Jidda, and all foreign representatives are officially received by him. As a rule the King visits Jidda twice every year, once after the great pilgrimage holiday, and at some other occasion. Generally the important figures of Jidda are received in audience by the King in this order: first, Saudi Arabians, government officials, leading businessmen and other distinguished citizens; second, foreign diplomats, for whom part of a day may be set aside; third, foreign firms, including executive heads of concessionaire companies, the representatives of foreign banking, shipping and other firms, to whom a period of time is definitely given in advance.

CONCESSIONAIRE COMPANIES

There are at present only two concessionaire companies in Saudi Arabia. The more important one is the Arabian American Oil Company which holds two concessions, signed May 29, 1933, and May 31, 1939, respectively. This company employs five to twelve thousand Saudi Arabians, five hundred

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other Moslems and twelve hundred Americans. The estimated maximum number of employees who will be ultimately engaged is twelve thousand Saudi Arabians, two thousand other Moslems and twelve hundred Americans.

The other concessionaire company is a metal mining company, the Saudi Arabian Mining Syndicate, Limited. This concession was signed December 24, 1934. There are at present seven to eight hundred Saudi Arabians employed, and a staff of twenty to thirty Americans, British and Russians. It is impossible at this writing to estimate the future maximum number of employees. That number will depend upon certain agreements which remain to be negotiated with the Saudi Arabian Government. Should these agreements materialize according to the plans of the mining company, there may be many more Saudi Arabian employees, and an increased staff of Americans and other foreigners. Further details with regard to the vast operations of the two companies will be found in the chapter dealing with oil and mines.

BANKS

Two banks, one British, the other Dutch, currently operate in Saudi Arabia. It is possible that an American bank may establish branches at the oil camp of Dhahran and at Jidda. The Egyptian Bank Misr operated only for a few years. The firm of Gellatly Hankey and Co., Ltd., is the agent for the British Westminster Bank, Ltd.; their business is not large. The principal bank is the Netherlands Trading Society, which has done extensive business for the Saudi Arabian Government through many years. It has handled, to date, all the funds dispensed in Saudi Arabia by the mining company, and many of the transactions of the oil company. Its

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very courteous and obliging staff consists of Dutch, Javanese and Saudi Arabians.

STEAMSHIP AGENCIES

Outside of Jidda there are no steamship agencies except those of the Khedivial Mail Line located at Yenbo and Wejh. Among the steamship agencies represented at Jidda, the following are the most important:

AGENT	for	LINES
1. Ali Reza Zainal		Mogul Lines Turner Morrison, Ltd. Halal Shipping Co. Cawasji Dinshaw Co.
2. Bank Misr		Misr Steamship Line
3. Fazil Arab		Hansa Line
4. Gellatly Hankey & Co., Ltd.		Khedivial Mail Line Pharonic Steamship Line P. and O. Co. British India Line Ellerman Lines U.S. Pioneer Line U.S. Roosevelt Line Isthmian Line
5. International Agencies, Ltd.		Dutch Lines, including Holland-Lloyd Blue Funnel Lamport and Holt

MERCANTILE FIRMS

Trade transactions in the international field were under Allied control during World War II and little free enterprise

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has been possible since 1940. The following are the principal firms dealing in exports and imports:

FIRMS	NATIONALITY
Ajaji Bros.	Saudi Arabian
Al-Qusaibi Bros.	" "
al-Jabir Bros.	" "
Ali Reza Zainal	" "
American Eastern Corporation	American
Bank Misr	Egyptian
Fazil Al Arab	Saudi Arabian
Gellatly Hankey & Co., Ltd.	British
Husain Uwaini & Co.	Saudi Arabian
International Agencies, Ltd.	British-Dutch

New foreign and local companies are now, with the end of the war, beginning to do international business in and with Saudi Arabia. The American Eastern Corporation is the newest addition to this list and has already handled large transactions and served the Saudi Government in many ways.

The King and his ministers have repeatedly expressed their desire for closer relations with the West, in particular, with the United States of America. Their experiences with the oil and mining companies, cordial throughout, have also been extremely beneficial to the country. The King has sent his sons, Prince Saud, Prince Faisal, Prince Khalid and Prince Mansour to Egypt, England and America to create better understanding with these countries. The first visit to America by a Saudi prince was made in the autumn of 1943. On that occasion, Prince Faisal and Prince Khalid, accompanied by Shaikh Ibrahim Sulaiman and Shaikh Abdul Khair and Shaikh Hafiz Wahba, Saudi Arabian Minister to London,

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and a bodyguard of two Arabs, were the guests of the U.S. Department of State. They were received at Washington first, then in New York and Princeton, after which they visited New Mexico and Arizona, and went on to California. They saw American methods of ore treatment and smelting in New Jersey, agricultural and animal husbandry methods in the semi-arid southwestern states, and oil production and refining in California. That was the beginning of a very practical American diplomatic policy which may pay huge dividends of international peace and prosperity, not only in our contact with Saudi Arabia but with other countries as well.

15. Lines of Communication

THE position of Saudi Arabia in world economy naturally depends upon the country's lines of communication, that is, upon its cable, telephone and wireless systems, its roads, air routes, highways, coastwise shipping and ports.

The one submarine cable connecting the country with the outside world runs across the Red Sea from Jidda to Port Sudan. It is owned by the Eastern Telegraph Co., a part of the Marconi system. At Port Sudan the messages are relayed to all parts of the world. Though the charges over the Red Sea section have been extremely high, the service, which was interrupted by World War II, is excellent.

There is telephonic communication by wire between Jidda, Mecca and Taif, and there are telephone exchanges in the same cities, as well as in Riyadh. Wireless communication exists between all towns of importance. The Marconi sets purchased over fifteen years ago have been augmented by the importation of higher-powered American sets to serve the Government, the oil and the mining companies. Telephonic communication is made possible by these sets between Jidda-Dhahran, Jidda-Riyadh and Jidda-Mahad Dhahab. Portable wireless trucks accompany the King on his travels inland and throughout his hunting trips. The proficiency of Arabians in operating the telegraphic code in both English and Arabic is remarkable. In 1940 when I investigated road construction possibilities in Asir at the request of the King, all my reports were sent to him by wireless telegraph.

ROADS

Except for the highway from Jidda to Mecca, the best roads in Saudi Arabia are those made by the Arabian American Oil Company in the vicinity of Dhahran in Hasa. They are well

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graded, with curves banked and at sufficient radius, and the surface is well oiled. The roads connect the main oil camp of Dhahran with the seaports of al-Khobar, Dammam, Ras Tanura and Jubail. The only other paved road, as noted above, is that from Jidda to Mecca, a distance of 46 miles, built and realigned under the supervision of Egyptian engineers. Good rock foundations were laid and covered with the usual graded stone aggregates, topped with Shell Company asphalt. The layout and construction were excellent; the only criticism is in the subgrade. Since it lacks absolute smoothness, the maximum car speed is limited; but excessive speed is thereby avoided and accidents are reduced. The Egyptian Government loaned the Saudi Government the funds for constructing this very important highway over which all the thousands of pilgrims landing at Jidda travel to Mecca.

The next most important road for pilgrim transport lies between Jidda and Medina. A great majority of the pilgrims make the journey to the tomb of Muhammad in this ancient and beautiful city. The distance is 239 miles over the present road. When a new one is constructed, much of it should be relocated considerably to the east of the present route. It would thus traverse better country, with more water and villages, as well as avoid the sands near Rabigh, Mastura and Bir al-Shaikh. It would follow the abu-Duba valley for some distance. The maximum elevation would be about 2,000 feet.

A good road would benefit commerce between Jidda and Medina. The gardens of the latter city are renowned for the size, flavor, and varieties of their dates, and other fruits as well as vegetables flourish, but most of the landowners are poor from lack of markets through inadequate transport. At Medina much of the irrigation water is pumped by engines operated by producer gas generated from charcoal. Ford and other motor-car engines have been adapted to use this type

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of fuel. This example might profitably be followed in a great many places in Saudi Arabia—hence the often repeated recommendation for the growing of the maximum number of *athl* (tamarisk) trees.

A road equal or greater in importance is that from Jidda to Riyadh. The distance is 600 miles. The present route via Ashaira (altitude 3,700 feet) has a maximum elevation of about 4,000 feet, but if another route were followed, passing through Taif, the elevation would be 5,100 feet at Taif. In 1939, at the request of the King and Amir Faisal, I found another route between Mecca or Sharia which would have much easier grades than the present one and be subject to far fewer washouts. The road now used follows river beds for about 75 per cent of its length. A good road to Riyadh would save the Government great sums of money, for the wear and tear on motor transport is enormous, the cost per ton excessive, and the comfort of travelers but a small fraction of what it might be. There is not sufficient transport or finance to justify the asphaltting of the 554-mile road (46 miles from Jidda to Mecca have already been paved), but approximately 50 miles through the sands called the Nafud, between Khuff and Morat, should be oiled. Gravel surface alone is all that is needed on roads throughout the country, except as noted.

Another much-needed road could be built from Riyadh to Jubail. Jubail is on the Persian Gulf and is the terminus of one of the main oiled roads built by the oil company. The distance is 325 miles. Through the Dahna for about 50 miles and across the sands between Hinnot and Jubail in stretches totaling approximately 70 miles, oiling is advisable. The rest of the road should be gravel-surfaced and in some cases realigned between Maagala and Riyadh. The road between Maagala and Jubail has been well laid out and graded by the

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oil company, which also developed good well water at this "wildcat" location. A good road here would cut the costs of imports into Najd from Persian Gulf ports, and facilitate travel for Government and oil company personnel. Much intercourse is necessary between Riyadh and the oil fields. An alternative road to the south is now more generally used between Dhahran and Riyadh. It passes through Abqaiq oil field and near but north of Hofuf. Oiling the surface through the sands would be advantageous.

Next in importance would be a road to connect Jidda with Jizan. The distance is now 527 miles and the road is terrible. One almost weeps to watch the cars climb over the jagged lava flows. The route now lies along the seacoast; investigation should be made to determine if a better route could be found along the eastern side of the Tihama coastal plain and at the foot of the mountain wall. There are difficult sands in the vicinities of Shuqaiq, Amk, Sharga, Hali, Kunfida, Shuwaik and Lith, lava flows near Gahama and Khor al-Birk, and *sabkhs* or mud-bridged swamps near al-Asaiba, southwest of Lith, and along the seacoast to the north of Lith, which might be avoided if such a route were practicable. The possibility should be thoroughly examined. If it were feasible, spur roads could then lead westwards to the seaports. The whole Tihama would greatly benefit from good roads. Fish and seaborne imports could be traded for the better fruits and grains raised in the plains and mountains.

The richest agricultural part of Saudi Arabia is in Asir, except for the Hofuf and other Hasa oases. The King and the Government are eager to develop this province and make it more accessible by the construction of adequate motor roads connecting the capital, Abha, with the Red Sea port, Jizan, to the west, and with the valley of Najran, near the edge of the Empty Quarter, to the east.

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To emphasize the inaccessibility of Asir it may be stated that when I made my first trip there in 1940, no American and no non-Moslem had ever been in the interior of the province. At that time, Ibn-Saud requested me to make a reconnaissance and advise him as to whether or not a road for motor transport could be constructed to connect Abha with the Tihama seaports which lie 7,000 feet below. The westward slopes of the mountains are bare rock and precipitous; they average thirty degrees and are, in places, steeper. There are few trails on which camels, mules or donkeys can carry any appreciable load. After several weeks of strenuous traveling, two possible routes were found for road construction, but one had twenty-three hairpin bends and an average grade of 9 per cent to negotiate a vertical distance of 2,850 feet, so it might be said that there is only one practical route. A 6 to 8 per cent grade with probably only eight hairpin bends could be worked out on this route. The total distance from Abha to Jizan would be 175 miles and the maximum elevation 7,150 feet, just to the west of Abha.

The other necessary road in Asir is one to connect Abha with Najran. The latter town and valley are 196 miles to the east along the plateau. There are many villages along the whole route. The rainfall is judged to vary from 10 to 5 inches. The floor of the Najran valley at the government headquarters is 4,000 feet altitude. The road route I laid out tentatively comprises seventeen *agabats* or grades which average 8.5 per cent. Much of the route follows the ancient *hajj* or pilgrim way from the Yaman. Some of it is even older and is still called *tariq al-fil* ("road of the elephant"). There are many remains of good stone-paving, like Roman roads. The alignment is well done, but many of the grades are too steep and curves too sharp to be incorporated into a motor road. The name suggests that this road was built during the at-

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tempted conquest of Mecca by the Abyssinians, with elephants, in the sixth century A.D.

Subsequently it will be of great benefit to construct a motor road from Najran to Bisha; thence one branch to the Wadi Dawasir extending up to Laila, Kharj and Riyadh, the other branch to go through Turaba to Taif and Ashaira. Still another important road project is one from Yenbo up the coast to connect with Umluj, Wejh, Duba, Muwaila and Qalāt al-Aqaba at the head of the Gulf of Aqaba. This road would form a junction with the one across the Sinai Peninsula to Suez and to the one to Maan in Transjordan. Still another would connect with Palestine. Yenbo is a seaport and should be connected with Medina to the east and with Mastura or abu-Duba on the main Jidda-Medina highway.

AIR ROUTES AND FACILITIES

The A.T.C. (Air Transport Command, U.S.A.) makes two calls weekly at Jidda, as does the British Overseas Air Company (B.O.A.C.), formerly the Imperial Airways, Ltd. These lines have flights from Cairo through Jidda and Port Sudan to Masawa in Eritrea. The planes used by B.O.A.C. up to 1945 were Lockheed-Hudson twin-motored monoplanes. Prior to the war, the K.L.M. (Dutch) and Imperial Airways served Saudi Arabia through their calls at Bahrain. Other airlines and schedules are now under negotiation, and the T.W.A. has concluded arrangements for air service.

At Jidda there is an excellent landing field and hangar. The latter was built by Italians for the Saudi Arabian Government. Planes have been presented to Saudi Arabia by the Italians and French in addition to the De Haviland biplanes obtained from the British in 1930. The mining company also presented its Bellanca "Skyrocket" plane to the Saudi Arabian Government after its survey and examination of the mining conces-

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sion were completed. The oil company had a Fairchild plane during its first years of mapping and reconnaissance.

There are a great many flat gravel places in the deserts of Arabia which make excellent landing fields. The mining company made fields for its plane at Jidda, Mahad Dhahab, Yenbo, Wejh and Duba. These are smaller than those required for the twin-engine Lockheed-Hudson, but could be enlarged if necessary.

HIJAZ RAILWAY

Many maps show this railway connecting Medina with Maan in Transjordan, and some even show it going to Mecca and to Jidda. However, there never was a railway to either Mecca or Jidda from Medina, although the survey was made for it to Mecca. This line from Medina to the Transjordan frontier was wrecked by Lawrence and his Arab allies during World War I and has not since been repaired. The dates of 1907 and 1908 are still seen on the twisted steel ties and rails. In most cases the culverts are washed out or blasted out. Along the railway line and in some of the stations are the sad wrecks of locomotives and frames of cars. The railway was built by contributions of Moslems throughout the Islamic world, and the title still remains with the *waqf* (the Islamic headquarters for gifts, bequests and investments). King ibn-Saud has been trying to get the Great Powers who destroyed the railway to rehabilitate it, but has had no success to date. On the other hand, when it was proposed to make a highway along the railway roadbed and sell the equipment as scrap, the reply was that it was in the hands of the *waqf* and the Saudi Government had not the right to dispose of it.

As has been said, a motor road connecting Transjordan with Medina would be of considerable benefit to Saudi Arabia, and facilitate pilgrim traffic from Transjordan, Palestine,

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Syria and Iraq—also from Turkey when the ban against the pilgrimage is lifted there. With the great development in the efficiency of motor transport, railways have lost much of their former importance where the tonnages to be handled are not great. There is at present no prospect for any heavy freight for the Hijaz Railway. Motor transport is much more flexible and better suited for varying amounts of passenger and light freight traffic. It is to be hoped that the *waqf* will use the great capital which would be required to rehabilitate the railway to finance a good highway instead.

COASTWISE SHIPPING—PORTS

There are two methods of moving seaborne freight. One is by the Khedivial Mail Line, at present the only steamship line giving regular service between Suez and Port Sudan via Wejh, Yenbo and Jidda. It maintains a weekly service each way to Jidda and formerly called fortnightly at each of the other ports, but at present these calls have been suspended. The freight and passenger rates are exorbitant. They were too high in proportion to the distance traveled even before the war; now they are much higher.

Among the lines which formerly made more or less regular calls at Jidda were the ships of the Blue Funnel Line, the Ellerman Line, the Mogul Lines (Turner Morrison of Bombay), Holland-Lloyd and Lloyd Triestino Lines. In bringing supplies for the mine and government oil tanks, the ships of the Isthmian Line, Roosevelt Pioneer Line and Shell Company tankers called. The German Hansa Line made occasional calls in prewar days.

Dhows constitute the other means of coastal shipping. The lines of the sea-going dhows, such as those built at Jizan, as has been mentioned before, are thought to be the same as those which the Phoenicians used in their trade with Corn-

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wall and the Mediterranean ports. The Saudi Government has built four or five modified dhows and equipped them with slow speed Diesel engines. These boats, which the Arabians call "launches," have the usual great lateen mainsail besides the engine. These ships' capacities are up to 100 tons, and the *al-Medina* took thirty passengers from Jizan to Jidda. Most of the privately owned dhows are smaller and have sails only. They carry a considerable total amount of goods, since much of the overseas steamer freight entering Jidda is distributed to various ports by sail.

All deep-sea freight is lightered by another type of dhow from Jidda anchorages to the customs quay. There is one exception, the supplies for the mining company. These and heavy freight for the Government and others are landed at the pier of the mining company, where there is usually 12 feet of water. One 15-ton capacity stiff-leg derrick, operated by a 38-horsepower Diesel engine, handles all heavy packages. The mining company's 15-ton White trucks are loaded at the company terminal compound with small freight, but heavy weights are handled on the pier by the crane. Service is given by the mining company to any who desire it, if they obtain the permission of the Government. A charge covering costs and a reasonable profit is made by the mining company. This company also has two 50-ton steel lighters and a 48-foot steel tug, powered by a 60-horsepower Caterpillar Diesel, for handling freight to and from the steamers.

Jidda is the most important port on the Red Sea in Saudi Arabia. Next in importance are Yenbo, 200 miles northerly, and Jizan, over 500 miles to the south. Wejh has a small harbor and lies 200 miles north from Yenbo. Formerly many pilgrims from Egypt and the north who were going to Medina were discharged in Yenbo, but in the past few years there have been very few, as practically all of them prefer to

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go first to Jidda and Mecca. About halfway between Yenbo and Wejh is the small but picturesque port of Umluj. Rabigh is another port, lying 96 miles north of Jidda, with an excellent small harbor. During World War I many supplies were landed here by the British for Lawrence and his troops. There is very little movement in this harbor now. North of Wejh about 90 miles is another small port called Duba. There are quite a number of fishing dhows here, also those which bring supplies from Wejh and Jidda. Still further north is Muwailah. Near here are the oil seeps which have caused a certain amount of interest among the investigators of the country's resources. From Muwailah to the head of the Gulf of Aqaba there are no real ports. On the Saudi Arabian side of this gulf there are few settlements or inhabitants. Between Jidda and Jizan the principal ports are Lith, Kunfida, Khor al-Birk and Dhahaban.

On the Persian Gulf coast of Saudi Arabia, the Arabian American Oil Company ports of al-Khobar and Ras Tanura are the most important. Huge tonnages of supplies and equipment for the development of the oil fields pass through these two ports. From al-Khobar the oil company runs a regular fast passenger service to Manama, Bahrain, several times daily. The oil tanker barges call at the oil docks a mile or two to the south of the main pier. Fifty miles to the south is Oqair, the former chief port through which most of the imports into Hasa and Najd passed. The ruins of an ancient town indicate that it has been a port for many centuries. On account of the facilities at the new ports of the oil company, the importance of Oqair has decreased in the last few years.

Sixteen miles to the north of al-Khobar is the ancient seaport of Dammam. The presence of a fortress over a spring suggests why this was chosen as the site of a town. This fortress is an island at high tide; the approach is very shallow,

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so that only small fishing dhows and boats now harbor there. Another 13 miles to the north is Qatif. The extensive date groves of this oasis, and those of Sofwa just to the west, are the source of a considerable amount of freight in dates exported to Bahrain for consumption there, as well as some for trans-shipment. Tarut Island lies a mile or two to the east of Qatif. The space between Qatif jetty and Tarut is so shallow at low tide that the big sea-going Hasa donkeys form the transport instead of boats. To the north and east of Qatif is the previously mentioned new oil port of Ras Tanura. The King had long contemplated this as a deep seaport for eastern Saudi Arabia. He requested me to examine it and give an opinion regarding it in January 1932, before there was any oil company or concession. It looked favorable and it was so reported.

Approximately 40 miles north from Ras Tanura is the town of Jubail, which has long been used as another entry into northern Hasa and Najd. The harbor is shallow but there is protection for small boats. To the west at the edge of the sand dunes are springs and a flowing artesian well. About a mile northeastward out to sea occurs one of the great submarine springs. When I first visited it in early 1932, there was a large spar buoy marking the location so that the pearling vessels and others could obtain fresh water by letting down buckets. Nearly 60 miles north from Jubail and opposite abu-Hadriya oil field is the possible port of Manifa.

Both along the Red Sea coast and the Persian Gulf are numerous dangerous reefs. On the British Admiralty charts of the Red Sea Arabian coast, a warning is written which states that since the currents along here vary both in velocity and in direction, mariners should give extra wide berth to all reefs. In 1937 the Shell Company marine superintendent was sent to Jidda to inspect the harbor approaches and facilities

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for tankers calling to supply the mining company with Diesel oil to be used at the mine power plant. He came from Suez on an Italian ship of the Red Sea Line. About 20 miles north from Jidda the ship's captain disregarded the warning regarding currents, and his ship went aground on one of the reefs. The Shell superintendent was not well impressed with the Red Sea coast. It took a week of careful examination of all harbor beacons and buoys before he could overcome his initial prejudice and recommend Jidda and the mining company basin as safe for his ships to enter. As it happened, this was the only wreck that had occurred for many, many months!

16. Oil and Mines

SAUDI ARABIA is presumably the only country in the world whose development of oil and mining resulted from purely philanthropic sentiment. The late Charles R. Crane of New York, onetime United States Minister to China, acquired a lifelong devotion to the Near East, dating back to his early sojourn in Egypt as a young man. Subsequently, he served on the King-Crane Commission which in 1919 reported to President Woodrow Wilson on the Syrian-Palestinian situation. He educated several Syrian Arabs in America and was a director of Robert College in Istanbul. His desire to help the Arabs prompted him in the winter of 1926-1927 to visit the Imam Yahia, ruler of the Yaman—and he was, incidentally, the third American ever to visit the Yaman's capital city, Sanaa. Genuinely impressed by the cordiality of Imam Yahia and his endeavor to promote his country's welfare, Mr. Crane made him a startling offer. The Imam, on hearing that there were mines in his country, had expressed a desire to engage engineers who might examine the land, and give him a report on their findings. Mr. Crane volunteered to secure such experts and to provide their services as a gift to the Imam and his country. The Imam accepted this unique offer, skeptically perhaps. Upon his departure from the Yaman, Mr. Crane passed through Aden where he related his experiences to the American Vice Consul, Mr. J. Loder Park, informing him of the proposal to provide the Imam with technical advisors.

In the spring of 1927 I passed through Aden on my return from a trip to Abyssinia. Mr. Park told me of Mr. Crane's idea and suggested a meeting between us in New York upon my arrival in America. The results of that meeting were the expeditions which took place from 1927 to 1932. My services

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were donated by Mr. Crane, entirely for the benefit of the Imam and his country.

Besides examining mineral and mining possibilities, the work included investigations regarding roads and layouts, the establishment of experimental gardens, the gift and demonstration of hand- and animal-operated farming implements and equipment, the installation of various types of pumps and of windmills and engines—all contributed by Mr. Crane. There was also the gift and erection of the only steel truss highway bridge in Arabia, and advice on many matters relative to the development of natural resources, transportation, etc. On the first expedition I had an able assistant engineer, Mr. Lowe Whiting; the next year I took Charles Bradley, the eighteen-year-old grandson of Mr. Crane, and Mrs. Twitchell as assistants; the third season, my assistant was Harry C. Ballard, an old mining friend from the western part of the United States.

Reports of these unusual gifts reached Saudi Arabia. In the winter of 1930-1931 Mr. Crane accepted an invitation of King ibn-Saud to visit him at Jidda. Long an admirer of the King, Mr. Crane was happy to discuss ways and means of rendering assistance to him and his realm. It soon appeared that ibn-Saud's principal desire was to find ample water supplies, especially flowing artesian wells in the Hijaz and Najd.

On March 30, 1931, I received a cable from Mr. Crane asking me to proceed to Jidda as soon as possible to examine the country for water possibilities, particularly in the vicinities of pilgrim routes. Engaged at that time in the construction of foundations for the highway bridge over the Wadi Laa in the Yaman, I arranged to leave the work in charge of Harry Ballard, and left the Yaman on the thirteenth of April, arriving in Jidda April 15, 1931. Traveling over 1,500 miles through the Hijaz, I could find no geological evidence to

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justify the hope for flowing artesian wells. A pessimistic report had therefore to be made on the water question. Though a number of possibilities could be pointed out regarding the development of water in small units, reclamation projects on a large scale were entirely precluded. But mineral possibilities were suggested by the dead oil seeps seen at Duba and Muwailih and the ancient mines at Umm Garayat near Wejh.

The trip was arduous and Mrs. Twitchell was ill part of the time. Ibn-Saud's special representative was Khalid Bey Gargoni, a man of high caliber who, driven out of Cyrenaica by the Italians, was given asylum by Saudi Arabia and served on the King's council for several years, beginning in 1932. For a secretary-interpreter he had a brilliant young Syrian from Lebanon, Najib Ibrahim Salha. Though the hosts did everything within their power for the comfort of our party, the small tires and comparatively poor engines of 1931 made the trip harder than it would be today.

Upon receipt of the discouraging report regarding water supply, the Finance Minister, Shaikh Abdullah Sulaiman Al Hamdan, was considerably disappointed, although he expressed profound appreciation of our efforts. The meeting with him was held outside Jidda at Nazla where Kazam Palace now stands. A small portable house served as the office and headquarters of the Finance Minister. It was evening and Persian rugs were spread out on the gravelly ground in front of the house. "Electreeks"—gasified kerosene lamps burning through mantles—gave a brilliant light. Shaikh Abdullah had read the reports carefully. After he had asked some pertinent questions he stated that the King and the Saudi Government quite realized that practically all their revenue was then dependent on the annual pilgrimage to Mecca; that this fluctuated from year to year, and might become much less in the future than it had been in the past. In view of these

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conditions I was asked if I could suggest other practical sources of income, it being understood that my reports did not encourage anticipation of any large agricultural increase in the Hijaz.

I had prepared for such a question. Because of experience with ancient mining in Cyprus, I had noticed mining possibilities during our recent trip. I had seen the ancient workings, mine ruins and tailings at Umm Garayat—near Wejh—so I replied that there might be minerals of commercial value in this country but that I had not yet seen enough to give an adequate opinion. Shaikh Sulaiman grasped the idea immediately and asked for further elucidation. In reply I explained that mining engineers must have facilities to travel over the country, take samples, make the necessary surveys and reports. Shaikh Abdullah Sulaiman thanked me and said he would present my ideas to King ibn-Saud.

On May 25, King ibn-Saud asked me to meet him at Shumaisi, on the Jidda-Mecca road about 16 miles from the Holy City and 30 from the seaport. Large tents were erected and a banquet was provided. The King expressed gratitude to Mr. Crane for my services, for the work done in the Hijaz and the meticulous care taken in making reports. He was sorry to have his hopes of artesian and other large water supplies dashed, but he said he would carefully consider the idea presented by the Minister of Finance. Ibn-Saud was pleased with my frankness; this has been found to be typical of him. He wants to hear the unfavorable as well as the favorable side of any matter under discussion. Before leaving Jidda on May 28, I was intensely surprised when Najib Effendi brought us a bundle from the King. It contained an exquisite memento for Mrs. Twitchell and Najdi robes, only worn by royal families and relatives, for myself.

We immediately returned to the Yaman and on completing

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the bridge piers at Wadi Laa left for home, stopping off again at Jidda en route to America. Two nuggets of gold had been found near Taif by a Turkish prospector. The King wished me to see the locality and verify the fact that it was native gold. That it was placer gold was confirmed, but the geology and topography were such that little chance of developing any property of commercial size was promised. However, I thought there might prove to be small areas which would be beneficial to the Saudi Government or the local groups. It seemed worthy of investigation.

On July 20 and 21 I had meetings at Jidda with the Minister of Finance. I presented my reports, as well as a plan for engaging competent engineers and geologists to examine Saudi Arabia for minerals and do sufficient clearing and development work in order to obtain a fair idea as to a reasonably valuable estimate and to make a competent report on each property that might interest foreign capital. On the twenty-second a check for £700 was given me by the Saudi Government to cover the initial traveling and other expenses of the engineers I was to engage on their behalf.

On my return to New York in 1931 I made complete reports to Mr. Crane. I recommended examination of the properties in the vicinity of Taif, by drilling and testing of ground water in the vicinity of Jidda, using in both cases the hand-operated Empire drill. I proposed also the erection of the highway bridge in the Yaman. We had completed the concrete piers but the steel had not all arrived from the seaport of Hodeidah when we had left the Yaman. Mr. Crane agreed to this program but stated that because of the depression this would have to be the last expedition which he would finance. The time limit was about six months. Mr. H. R. Mosley accompanied me as assistant, and we reached Hijaz in late October of 1931.

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Mosley, with an able Arab, Ahmad Fakhry, who supervised the laborers, and some soldiers, spent nearly six months in drilling, pitting and sluicing in the vicinity west of Taif. Efficiently done, the work was nonetheless disappointing. Although "colors" and fine gold were found, nothing developed which would be profitable to even local groups of Saudi Arabia. Mosley conducted all his work with great care and efficiency.

After starting the placer work I returned to Jidda to rehabilitate the city's water supply. This was called the Waziria water system, as it was said to have been built by a Turkish Wazir (cabinet minister) some sixty years before. The water tunnels and terra cotta piping were repaired. With the efficient assistance of Cyril Ousman, then automotive and condenser engineer for the Saudi Government, a 16-foot diameter American windmill was erected along with an auxiliary pump-jack and small Diesel engine. It raised an average of 40 gallons per minute into the water tunnel and flowed to Jidda 7 miles to the west, making an appreciable addition to the city water supply.

On the completion of this work in December the Finance Minister said that King Abdul Aziz would greatly appreciate it if I would go across Arabia to advise him on the water resources and oil possibilities in his province of Hasa along the Persian Gulf. Although this would be a thousand-mile trip over rough country, where no American had ever been, the invitation was readily accepted.

Arrangements were made for Mrs. Twitchell to take charge of the Empire drill testing for ground water east of Jidda. She did a very capable job and had the unique experience of directing a crew of twenty to thirty devout Moslem Najdis, who served her with great courtesy. She lived alone in the

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house assigned to us in Jidda by the Government—an unusual situation for a non-Moslem woman.

Leaving Jidda for Hasa via the placer at Taif on December 13, 1931, I arrived at the camp of King ibn-Saud on the nineteenth, at Maizila, about 50 miles north of Riyadh. Here during an interview the King asked me to visit Bahrain and gave me letters to the Sultan and to the merchant princes, the Qusaibi brothers. At this camp I met H. St. J. B. Philby, the eminent Arabist and explorer of Arabia. It was after this encounter that Philby made the second crossing (northwestern) of the Empty Quarter. Mr. Bertram Thomas had made the first and more extensive crossing (southeastern) the year before.

I returned to Hofuf via Oqair on January 10 1932. The King had arrived from Najd on the twelfth, and asked me to call for a discussion of the trip. As always I had a most cordial interview with unexpected queries and subjects arising. Ibn-Saud asked me to arrange for oil geologists and oilwell drillers. I recommended strongly that the results of the Number 1 Well at Bahrain be awaited before doing anything regarding oil. Since no evidence of faulting or difference geologically between Bahrain and the mainland of Hasa could be seen, and in view of the fact that oilwell exploration and drilling is extremely expensive, and that if the Bahrain well did not strike commercial oil it would be unlikely that it would be found in Hasa, a definite wait-and-see policy was advocated. On the other hand, if the Bahrain well proved a success, it was logical that commercial oil would be found in Hasa, but in greater quantities, because of its much greater area. Furthermore, it seemed quite possible that American capital might be found to undertake the great expense of oil development in Hasa under conditions that would greatly benefit Saudi Arabia. After much deliberation the King de-

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cided to follow this advice. During the discussions, he said that he had a former arrangement with a foreign oil company concerning Hasa, but as they had not lived up to their terms of agreement he wanted nothing more whatsoever to do with them.

As usual, Shaikh Yusuf Yaseen, Chief Secretary, and Shaikh Abdullah Sulaiman, Minister of Finance, were with the King during nearly all of these interviews. They expressed their opinions and asked questions only at separate discussions, not in his presence. Knowing that my time was limited to six months, the Finance Minister wished me to return to Jidda as soon as possible to look at some ancient mines. This I did, after a farewell interview with the King on January 17. On leaving the next day a beautiful silk Arab gown from India for Mrs. Twitchell and a *mashlah* for myself were received, again in conformance with Arab hospitality.

The reports, which had to be typed, translated into Arabic, typed in Arabic and then checked by February 3, were completed after my arrival in Jidda on January 26. On February 8, we left with our staff for an ancient working said to be only three days' journey from Jidda. We had two Ford cars and two Ford trucks, with a total of thirty men. Gasoline, oil, spare parts and tires, as well as food, tents and water, made each vehicle overloaded. Traveling to within a few miles from Medina, we crossed river beds, hills and lava flows, brush and desert for eight instead of the estimated three days. At the end of a trip of 426 miles, the ancient workings, called *Mahad Dhahab* ("cradle of gold"), were reached. This is the mine now being worked by the Saudi Arabian Mining Syndicate, Ltd. In contrast to that first trip, the road now connecting Mahad Dhahab with Jidda is 246 miles long and is regularly traversed by 15-ton trucks even though a 3,700

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foot summit is crossed. In a light car the time is usually about ten hours, including stops for lunch and water.

February 15-20 were spent in the examination, including surveying, photographing and sampling of the mine. The return to Jidda was more easily made; the distance was reduced to 404 miles and accomplished in five days, with arrival in Jidda on February 25, 1932. The samples were shipped to New York and to London to be assayed and checked. Reports were written and maps plotted. The six months' period donated by Mr. Crane was about to expire and I began to wind up that part of my work. H. R. Mosley sailed for New York on March 7 and on the same day Mrs. Twitchell and I sailed for Hodeida, where we met the American Bridge Company foreman, Dennis Castongay. An expert on steel erection, he and I were the only Americans on the job. In 19 days the 122-foot steel truss highway bridge was completely erected. On April 26 we again landed in Jidda, as previously arranged with King ibn-Saud and at his expense, but with Mr. Crane's agreement. During a trip of 1,022 miles five ancient mines were examined, but none showed sufficient value or tonnage to be of interest. On May 6 the results of the assays of the samples taken at Mahad Dhahab Mine were received, indicating satisfactory commercial values of ore.

From evening till midnight of May 25 I had a discussion with the King's representatives, Shaikh Abdullah Sulaiman and Shaikh Yusuf Yaseen, regarding the possibilities of developing mines, oil and roads in Saudi Arabia. The King had sent Shaikh Yusuf to say that on account of the depression, with the lack of pilgrims and consequent fall in revenue, he could not afford to follow out the development program planned and agreed upon. Furthermore he wished me to try and find capital to carry out the development previously discussed. To this I replied that I was an engineer and not a

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promoter in any way, but that I would be glad to do my best under two conditions: first, that Mr. Crane would be consulted, his consent obtained and participation offered him; second, that His Majesty would sign a letter authorizing and requesting me to undertake this project. Neither of the two ministers could write the letter or make the decisions, but they agreed with my views and said they would submit the matter to ibn-Saud and write subsequently.

On July 1932 a letter of request and authorization reached me in New York. Mr. Crane also gave his consent for the use of all the data gained at his expense, but he stated emphatically that he did not wish and would not accept participation in any company, or companies, which might be formed for this work. He did not wish a statement ever to appear to the effect that there were ulterior commercial motives behind his philanthropic activities in Arabia. It is noteworthy that he carried out to the letter his decision not to share in any business venture that might grow out of his friendly aid to the Arabians. When, in due course, I informed the oil and mining companies concerned of Mr. Crane's connection with the investigations, each in turn authorized an offer of participation. But as Mr. Donald M. Brodie, office manager for Mr. Crane, will confirm, each offer was declined with his thanks.

OIL

In presenting the economic potentialities of Saudi Arabia to possible sponsors in the United States, I first turned to mining concerns, expecting them to be the most responsive. But I soon learned better when the several companies approached began to turn me down one by one. The consistent pattern of their attitude was that although the reports were interesting and the proposition seemed promising, it was too speculative a venture, since Saudi Arabia was an entirely

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unknown country. Some said that they thought the project should have greater appeal to British groups who are operating in Africa, India and Asia.

In the meantime I had begun to make inquiries regarding oil companies. At the suggestion of a mining friend, R. Gordon Walker of the Oliver Filter Company, I met Terry Duce of the Texas Company. After a cordial interview he asked me to return in a few days, but when I did, I was informed that the company had decided it would not take the offer. Mr. Duce suggested that the Near East Development Company and the Standard Oil Company of California be approached on the matter.

It so happened that I called at the office of the Near East Development Company first, meeting Mr. Stuart Morgan, its secretary, and Norval Baker, geologist. They expressed considerable interest, Mr. Baker carefully going over the geological notes. Mr. Morgan promised to let me know if his company were interested, but made it clear that I was not bound in any way. He strongly emphasized that his parent company—the Iraq Petroleum Company—was the most powerful group of oil companies in the world, and that though it had been caught napping while the Bahrain oil fields were negotiated for by another organization, it would not permit itself to do so again.

Next, I had the privilege of meeting officials of the Gulf Oil Company, Mr. Guy Stevens, a director, and Mr. Meaker, a geologist. I went over my notes with these gentlemen in New York, and at their invitation went to the central office in Pittsburgh where I had a cordial conference with Dr. Heald and his associates. Asked about their prior understanding with the Iraq Petroleum Company, they replied that they thought it would not interfere with this proposition but that, in any case, their legal department would report. Shortly after

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my return to New York I was informed, however, that their Iraq Petroleum Company obligations would not permit them separately to undertake an enterprise in Saudi Arabia.

Soon after this disappointment, Mr. A. S. Corriell, New York representative of the Standard Oil Company of California, asked me to call at his office, and arranged for a meeting with H. J. Hawley, a geologist who had just returned from South America. Mr. Hawley took notes on the Saudi Arabian geological data and expressed the belief that his company would contact me again. Shortly afterward, Mr. Loomis of the Standard Oil Company of California called on me. Two other conferences, accompanied by close communication with the head office in San Francisco, led to specific arrangements for a meeting with Mr. M. E. Lombardi in New York. There it was finally agreed that the Standard Oil Company would undertake to negotiate to an oil concession in Saudi Arabia. Mr. Guy Stevens, an official of another organization, had praised the personal integrity of Mr. Lombardi highly, and my experience fully confirmed that opinion. These oil people were very fortunate to have the assistance of a man such as M. E. Lombardi, as he persevered in urging the expansion of his company in the Near East. His farsightedness has resulted in obtaining American control of what is probably the second greatest oil reserve in the world today. In New York Mr. Lombardi had a power of attorney made out and given to me as evidence of authorization to act on behalf of the Standard Oil Company of California.

Accompanied by our son, Mrs. Twitchell and I sailed from New York on January 13, 1933, for London, where we were to meet Mr. and Mrs. Lombardi and Mr. and Mrs. Lloyd Hamilton. Mr. Hamilton was to write the terms of the oil agreement and take care of all legal technicalities, while I was to give advice on Saudi Arabia and local conditions. This

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arrangement proved entirely satisfactory. I defined the boundaries, but Mr. Hamilton wrote the terms and finally signed the concession on behalf of the oil company, while the Minister of Finance, Shaikh Abdullah Sulaiman Al Hamdan, signed on behalf of the Saudi Arabian Government. The very able and simple form of this agreement is outstanding, and contributed to the reputation of Lloyd Hamilton, which is of the highest in oil circles.

Negotiations for the concession were culminated at Kazam Palace in Nazla, a suburb of Jidda, on May 29, 1933. Najib Salha, an officer of the Saudi Government, acted as the sole interpreter and secretary. Fountain-pen sets were given by the oil company to the various officials connected with the negotiations, and a brief case was presented to the interpreter. No money or other presents of any kind entered into the business deal with the following exception: a "reward" was given to me by the Saudi Arabian Government, as they had promised, and to which Mr. Lombardi said there would be no objection. Mr. and Mrs. Hamilton left directly after the agreement was signed, but the company requested me to remain a while to attend to the next steps.

The first of these was the payment of a loan of £30,000 in gold sovereigns at Jidda to the Saudi Arabian Government. This gold payment was a great tribute to the farsighted policy of the directors of the Standard Oil Company of California. It is especially eloquent of the vision and wisdom of Mr. Lombardi and Mr. Stoner. The depths of the depression in the United States had about been reached and the "bank holiday" just declared. Americans were suffering more severely than any other people in the world: nearly everyone was despondent and pessimistic. These oil men deserve great credit for their faith in America and American enterprise.

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After obtaining the concession, a company for operating in Arabia was formed by Standard Oil of California. This was named the "California Arabian Standard Oil Company"; later the name was changed to the "Arabian American Oil Company." Shares are held equally by the Standard Oil Company of California and the Texas Company.

The loan was paid and every sovereign counted at the bank of the Netherlands Trading Society, Ltd., in Jidda, on August 25, 1933. The terms of the concession are somewhat similar to those of the Iraq Petroleum Company and were published in the *Umm al-Qura* newspaper of Mecca which serves as the official organ of the Government. After paying the loan and dispatching the receipts authenticated by the Dutch Legation at Jidda, I proceeded across Arabia to Bahrain, arriving there September 3. There Mr. E. Skinner, General Manager, had the personnel and equipment prepared for the preliminary geological examinations of the Saudi Arabian oil concessions—roughly an area of 140,000 square miles.

The first geologists were H. P. Miller, chief, S. B. Henry and S. Hoover. I was to introduce them to the various Saudi Arab Government officials in Hasa; also to lease headquarters at Jubail and Hofuf, and assist in getting the supplies through the customs at Oqair. The new cars with 7½" x 15" tires were a great aid in traveling over the sands. The Qusaibi brothers had offices in all the principal towns and as agents for the oil company they facilitated many matters.

Within about a week after landing at Jubail the great dome at Jabal Dhahran had been visited and the first oil camp in Saudi Arabia established. This has now been drilled and proven to be one of the world's great oil deposits.

A modern oil village has been established at Dhahran, and in accordance with its usual policy the oil company does everything practically possible for the welfare and comfort

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of its staff and employees. The loyalty of the personnel is proof of the wisdom of this policy. The benefit to all Saudi Arabia is very material, as many of the Saudi Arabian employees set aside enough of their wages to purchase homes, small date groves, bands of sheep and camels, as well as spending a certain amount of money for better clothes and greater variety of food for their families.

The oil company has instituted a sanitation program at Dhahran which is spreading to the nearby villages of al-Khobar and Dammam. It is also conducting schools with the co-operation of the Saudi officials. Great credit is due to the management and staff of the oil company for their tact and diplomatic dealings in a strange country. The policing of all company property is done by soldiers appointed by the Government but paid by the company.

Another great ultimate benefit of the oil operations is the drilling of water wells at all the "wildcat" oil prospects. Whether oil is found or not, the water remains an asset to the country. At present there has been commercial oil proven at Abqaiq, 37 miles southwest from Dhahran or Dammam oil field, and at abu-Hadriya, 50 miles northwest from Jubail and 95 miles from Dhahran. At Maagala, which lies 164 miles almost due west, the hole was not completed. Should this bring in commercial oil, a pipeline of approximately 135 miles would connect it with abu-Hadriya and the coast near Manifa and the oil probabilities would be even greater.

In 1943 an eminent oil geologist, E. L. De Golyer, estimated the proven reserves at two billion barrels, the indicated reserves at between four and five billion barrels, and a possible reserve of twenty billion barrels, according to the statement appearing in *Fortune Magazine* for June 1944.

In 1939 a second oil concession was obtained by the California Company. This was negotiated by Mr. W. J. Lenahan,

who had been the Jidda representative of the oil company since September 1933. This new area included all the sedimentary formation from the original concession boundaries (on the west side of the Dahna) to the contact with the igneous rocks where oil occurrence is impossible. In these negotiations Mr. Lenahan had the opposition of the Japanese offers supported, or at least introduced, by Sr. Silitti, the Italian Minister. At the same time Fritz Grobba, the German Minister, called at Jidda. He was Minister to Iraq at Baghdad, and also accredited to Saudi Arabia. It is more than likely that he might also have tried to further the application of the Japanese. The terms offered by the Japanese were as tempting as they were fantastic. Mr. Lenahan at Riyadh told the King that such terms were not commercially practicable and that he would not attempt to match them. In conversations with the Finance Minister and Shaikh Yusuf Yaseen I had no hesitation in saying that I was sure that the Japanese were after a concession principally to secure a foothold in Arabia; that their terms were political rather than commercial. I believe Mr. Lenahan at Riyadh made similar statements at his audiences with the King. After considering the matter from all points of view, King ibn-Saud stated that he preferred to continue to deal with his American friends, so the Japanese went away empty-handed.

The King's confidence has been amply justified, for the oil company has advanced great sums of money over and above current production royalties. This aided the Government when its revenue from the Moslem pilgrims was practically cut to nothing by the war. Both the oil and mining companies have made loans to the Government besides the immense sums loaned by the British Government, and by the American Government through Lend-Lease, as well as the August 1946 loan by the U.S. Import-Export Bank. In addition to financial assistance, the oil company has greatly aided the

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Government through technical services and advice on water resources in Najd, the layout of irrigation systems at the Kharj, surveys of the frontier between Iraq and Najd and counsel on a great many questions. Mr. Max Thornberg of the Bahrain Petroleum Company has joined with the officials of the Saudi Arabia Oil Company in rendering much friendly counsel. The present organization under Mr. J. MacPherson, the resident vice president at Dhahran, and the general manager, Mr. Floyd Oligher, conduct the affairs of the company in a most able and efficient manner.

A matter which more than any other single item brought Saudi Arabia to the notice of the American public was the proposal of a pipeline to convey Saudi Arabian oil to the Mediterranean. This was first publicized in February 1944. It was quite natural that the oil companies competing with the American Arabian Company and the Gulf Oil Corporation would not wish to see an outlet on the Mediterranean. The I. P. C. already had its pipeline discharging at Tripoli and at Haifa.

Some Americans did not wish the Federal Government to enter any further into private enterprise, even though the British Government had been benefited greatly by its stock holdings in the Anglo Iranian Company, the Royal Dutch Shell Company and the Iraq Petroleum Company. A fact which was not brought out during the discussions of the pipeline was the provision of a 1,000,000,000-barrel reserve for the United States Navy, to be sold to it at 25 per cent under the then market price. If this were taken at the present ceiling price of \$1.11 per barrel the Navy would save a total of \$277,500,000, or roughly twice the amount the United States Government proposed to advance to cover the estimated cost of the line. In addition the Government was to be repaid its entire outlay within twenty-five years. This did not seem to

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be an unsound business proposition in any respect. Though it committed our Government to a fixed foreign policy for at least twenty-five years, many people would not deem it a disadvantage to the general welfare of American enterprise. At any rate it was finally decided that on account of the political controversy the companies will probably finance and construct a pipeline without the participation of the United States Government.

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As the reader will have noticed, the origin of the mining enterprise was parallel with that of oil, and connected with it until December 1932, when my services were devoted entirely to the oil company. At the end of 1933, however, I terminated my connection with the oil company and went to London, where I endeavored to fulfill the second part of ibn-Saud's desire for the development of the country's natural resources, namely, the finding of suitable capital abroad for the working of mines.

In this instance, I did not go to New York, for all concerns there that were likely to be interested had already been approached without success. From January to March 1934 I met with consultants and directors of all mining companies whose central offices were in London, with the exception of the Chester Beatty group. To an engineer mainly concerned with facts and figures, and not with broad policies of trade and personalities, the task of finding capital to initiate mining in a country where no engineer had ever been before was a rather thankless job. Most of the officials met were extremely cordial. They studied the reports and photographs eagerly, and in a number of instances recommended the project, only to be finally overruled by their respective boards of directors. The universal opinion seemed to come close to that prevailing

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among the New York groups: Saudi Arabia was little known insofar as its government, transport, labor and climatic conditions were concerned. The project was, therefore, too speculative to deserve serious consideration.

Finally, during lunch one day with old American friends, Robert Edwards of the Anglo-Oriental, Ltd., I was relating my various experiences, but not thinking that a tin company would be interested, when Edwards requested a report and data to be brought to his office. There I met another official of that company, Gerald Hutton, an American of New Zealand origin. I was requested to return in a few days. On that occasion, after many pertinent questions were asked, Edwards and Hutton made it known that their directors, of whom Mr. John Howeson was chairman, had decided to take up this project. They planned to form a syndicate and asked me to approach all the groups to whom I had introduced this enterprise.

I proceeded to invite the groups to participate, and was pleased to discover that nearly all of them were willing to join in. The shares were, in fact, oversubscribed. One American group, however, insisted on a certain number of shares, and withdrew when they failed to receive them. It is not generally realized to what extent American and British mining companies are interdependent in personnel. The co-operation and happy relations between British and Americans in mining enterprises is a good omen for future collaboration and one which other international projects should emulate.

In May 1934 the syndicate was constituted as the "Saudi Arabian Mining Syndicate, Ltd." On June 27 I arrived at Jidda. From July 23 to November 7 I lived at Taif and the concession agreement was signed December 24 at Jidda. It was authenticated by the British Vice Consul, Cyril Ousman, December 25, 1934. The boundaries included practically all

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of the Hijaz, an area approximately of 110,000 square miles, the size of the British Isles, more than twice the area of the state of New York.

The negotiations were conducted with Shaikh Abdullah Sulaiman, Minister of Finance, Shaikh Yusuf Yaseen, Chief Secretary to King ibn-Saud, and Khalid Bey Gargoni, an adviser to His Majesty. The delays between meetings were about the most trying I have ever endured. Taif, of course, is restricted to Moslems except under very special circumstances. The various officials, guests of the Government and other Arabians were most cordial, and called on me, but time passed very slowly.

The man who acted as secretary and interpreter during the negotiations was an employee of the Saudi Government, the same one who acted as interpreter during the oil negotiations. No presents of any kind were given to any officials or other interested persons, including myself, during the transaction. The great delay in reaching an agreement was caused by the fact that no cash payment or loan of any kind was given the Saudi Government. It was very difficult, in view of the loan made by the oil company, to convince the King and Government that mining negotiations were conducted on a different basis, but finally this was accomplished.

On December 26 I left for Egypt, Iraq and England. In Egypt the Ford Company gave us every facility for the special equipment and special bodies for the station wagon and three trucks which were needed to initiate the mine prospecting program. I had agreed with H. St. J. B. Philby to examine a supposed gold property in Iraq in which he was interested, provided the negotiations on mines were successful. So, after placing orders in Egypt for the cars and other supplies, I proceeded to Qaara, north of Rutba Wells, Iraq. Then at Damascus on January 11, 1935, I received a cable from the Lon-

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don office that the syndicate had ratified the concession agreement—the conclusion of six months of arguments, explanations and long intervals of enforced inaction.

When the mine examination at Qaara was completed, I set out for London, arriving there on January 25. After a busy time ordering prospecting and development equipment, and conferences with the Syndicate, I flew back to Egypt, leaving London February 9 and arriving in Alexandria on the eleventh and at Jidda the seventeenth. Finally the detailed examination of the mines was started on March 1, 1935. As can be imagined, it was not easy to gather personnel to man an expedition into districts where no non-Moslem and very few Arabs, except Bedouins, had been. The staff included Harry C. Ballard, originally from Denver, Colorado, who had been with me in mines in Idaho and on expeditions to the Yaman. Then W. A. George, a Britisher from Cornwall, was engaged as assayer. Byron Shanks, who came up from Australia and had had technical mining training as well as practical placer experience, was to drill to determine if there were a commercial placer in a large river bed, the Wadi Yenbo, at al-Darr. He did exceedingly good work under difficult conditions those first six months. There was also Bishopp, who had residence in Alexandria, but, I believe, was born in England. He had office experience and was engaged to look after the camp organization as well as the accounts. Another staff member was a general assistant, Arthur Van der Poll, a native of Holland who had lived in the Hijaz many years, conducting a very successful shipping agency which he had recently sold. He had been converted to Islam and spoke Arabic well, so he was of very great service in obtaining supplies and personnel. He was tireless in getting equipment through Jidda customs and up to the sites where it was needed, and during that first year was most valuable to the undertaking.

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The other member of the staff was Ahmad Fakhry, a British subject of Sudanese citizenship and Turkish ancestry, a monument of integrity and loyalty. He acted as interpreter and assistant to Shanks for six months. Since then he has served the mining company in many capacities.

The terms of the mining concession agreement gave the syndicate a period of two years in which to examine an area the size of the British Isles and to select the mine or mines which it wished to develop into commercial production. Through the study by Ahmad Fakhry of ancient books in libraries in Mecca and Medina, and my reading of works by Richard Burton and other Arabian travelers, as well as through 40,000 miles of flight in our Bellanca "Skyrocket" monoplane, with ground examinations by four ground parties, a total of fifty-five ancient mines were located. Of this number seven were diamond drilled. It was disappointing that only one of those seven proved of sufficient size and value to justify development and equipping with a mining and treatment plant. This mine is called by its ancient name, Mahad Dhahab, "the Cradle of Gold." Whether or not this is a true indication of its value remains to be seen.

There were two distinct periods of working this property, as evidenced by the ancient tailings. The oldest tailings underlie the modern. The age of the latter is from A.D. 750 to 1150, according to Kufic inscriptions found among them. No evidence is yet found to determine the exact age of the underlying tailings, nor is there evidence to show the lengths of time embraced in the two, or whether there were possibly more operating periods. From the general appearance of the ancient stopes in the mine mountain, as well as of the tailings, it seems not impossible that these date back to the time of King Solomon. There is a legend that Umm Garayat Mine—14 miles from Wejh—was worked by miners of King

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David, father of King Solomon. As the workings of Mahad Dhahab are the largest I saw in Arabia or in the Sudan, it is a reasonable guess that this might have been a source of the gold of King Solomon. It may possibly be called one of "King Solomon's Mines."

In very ancient times gold had much greater purchasing power than at present. Furthermore, it is likely that most of the miners were slaves, receiving only their food and a pitiful bit of shelter for their labor. There would have been little overhead and no equipment, so that work could be done only during rainy seasons. The labor could then be used elsewhere. It is evident, therefore, that in ancient times there was a very substantial output and profit from workings which it would not pay to operate with expensive modern equipment and technical staff.

According to the concession terms an operating company had to be formed by the syndicate upon the expiration of the two-year period. As one mine only had been developed, it was decided, with the consent of the Saudi Government, to form the syndicate into a company. According to the agreement, 15 per cent of the shares of the company were allotted to the Saudi Arabian Government as payment for the mining property, besides a royalty of 5 per cent of the gross value of the metals recovered and paid for. In addition, 10 per cent of the shares had to be offered for subscription to Saudi Arabian nationals and to the Government. Most of these shares were taken up and paid for by them. Therefore the Government and citizens have nearly a 25 per cent share in the profits and responsibilities of the company. This participation by the country and government in which natural resources are being developed and extracted, plus the participation by American, British and Canadian interests, is a fine example of international co-operation.

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The Mahad Dhahab Mine is unique in that it has three classes of ore. First come the tailings, already mentioned. Secondly there is a certain amount of low-grade ore lying at the surface between the ancient stopes, much of which has already been cheaply mined by quarry methods. Thirdly there is the underground ore, which was prospected by thousands of feet of diamond drilling and is now being blocked out by drifts and crosscuts at approximately three hundred feet below the surface.

The treatment of the ancient tailings by the mining plant has included some unique problems. The ore is classed as complex because it contains the sulphides of copper, lead, zinc and iron. But, in addition, the droppings from camels, cattle and mankind, as well as the charcoal from their camp fires, has during the past thousand years introduced elements which have caused many hitherto unknown difficulties in the floatation and cyanide circuits. The able mill and mine staff under the competent management of John F. Park, with the research by the American Smelting & Refining Company and American Cyanamid Corporation, have finally solved the various problems. But complexity of the ore makes it necessary to produce in Saudi Arabia only oil floatation concentrates and cyanide precipitates which are shipped to huge smelters in New Jersey, as only very extensive plants can separate and recover in marketable form the various metals.

The present indications are that the mine will be of very considerable benefit to Saudi Arabia. Direct benefits come from the distribution of dividends to the Government and over seventy Saudi shareholders, and from the 5 per cent royalties to the Government, as well as from the distribution of wages to the thousand direct and associated employees. The indirect benefits are also considerable, including 10 per

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cent customs duties, the locally mined lime, locally produced food and sundry other supplies.

The illiterate and inexperienced Bedouins have learned a certain number of English words and have been taught to operate the many parts of the complicated equipment in a mining plant. The Arabs who have the higher skilled positions are usually those who formerly were drivers of motor transport. The skill with which they operate the power shovels is surprising. The very few accidents to motor transport while the big 15-ton White trucks are driven over a 3,700-foot summit, on a 500-mile round-trip, is evidence of the amazing adaptability of the Saudi Arabian. This is also a tribute to the efficiency and patience of the members of the overseas staff.

Although during the prospecting period of two years all possibilities of commercial minerals were investigated, nothing of great importance was found. At Jizan, chief seaport of Asir, there is a rock salt deposit which the Government mines in a very primitive way. Locally manufactured black powder is used there as the explosive. The holes for blasting are hand-churned, using one inch and 1.5-inch diameter steel bars.

After my visit to Jizan in 1940, I outlined a plan whereby a tractor-operated bulldozer and a La Tourneau scraper could be used to remove the overburden, and a portable compressor with machine drills might increase the salt output. I emphasized, however, that an adequate market must be developed to absorb such an increased output. Rock salt usually has one per cent more sodium chloride and is less soluble than solar salt. Consequently, it is more desirable for preserving hides and skins, and so commands a certain market and a higher price. India was formerly an enormous market for the salt mined at Salif in the Yaman. In western

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Abyssinia salt is so scarce and highly prized that I have seen it in use as currency. Should an outlet be found for the Jizan salt, a mining industry of considerable benefit to the district might emerge.

In the Rabigh district there is a virgin deposit of barite. This would be valuable only to the oil companies for use in drilling. Investigation to date indicates that about 10,000 tons might thus be used annually. Such a demand would not of itself justify a mining and crushing plant at the present price per ton.

In the Wejh district there are small ancient workings where very irregular deposits of galena had been mined, but the amount of lead obtained was very little.

There are resources of iron ores—mostly specularite—and large slag dumps at Aqiq in the vicinity of Mahad Dhahab, but no large deposit has been seen as yet. The price of iron ore precludes any lengthy transportation, and it seems probable that there is little hope of any benefit to the country from this source.

I saw mines located at Burm, south of Taif, and Nefi, north of Duwadami which are unique. At both places there were extensive stopes (workings) and dumps. Ancient books on travel had reported silver at Burm, but examination showed no silver minerals and assays gave no silver values, nor any values in rare minerals. But on the stope dumps and among the ruins there were fragments of various kinds of dishes, basins suitable for pans, and the open type of lamp. In most of Najd and highland Hijaz there is no clay with which to make pottery. There were no copper deposits or smelters for making metal pans and utensils. The alternative was the mining and cutting of the andesitic schist into shapes to serve as basins, dishes and lamps. The sizes of the ruins prove this unusual mining to have been an important and extensive industry.

17. Future of Commerce and Agriculture

DURING my stay at Riyadh in 1940, King ibn-Saud one day voiced his desire that interested groups or companies be found who might be willing to undertake a thorough examination of Najd's water resources and agricultural possibilities. He went on to express a wish for the introduction of drilling, pumping and farming equipment. At my request a document embodying this oral commission was later handed me by order of the King.

Upon my return to America, and following conferences with representatives of the Departments of State, of the Interior and of Agriculture, as well as with the directors of oil and mining companies, I found it impossible to find the capital necessary to carry out the King's request. Nonetheless, the mining company authorized me to travel over the southwestern states where conditions are somewhat similar to those of Najd. The Department of Interior gave me facilities to study the operations of the Indian Office among the reservations. Mr. A. L. Wathen, Chief Engineer, Bureau of Indian Affairs, U.S. Department of the Interior, introduced me to Vernon Edler, President of the Peerless Pump Company, whose firm had made many pumping installations for irrigation. The amazing work done in Texas, New Mexico, Arizona and California was brought to my notice.

When the 15,000-mile trip was concluded, it was decided that a message be sent ibn-Saud informing him that companies ready to meet his request were not available, and proposing that he accept instead a mission sent by the American Government. The mission would examine and report upon the agricultural and irrigation possibilities of all Saudi Arabia, and submit to him recommendations regarding methods of development. The exchange of cables led to the

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first official mission of goodwill, sent by the State Department of the United States to King Abdul Aziz ibn-Saud. It was financed by the emergency funds of the President.

The personnel consisted of J. G. Hamilton, agronomist, Soil Conservation Service, U.S. Department of Agriculture, and A. L. Wathen, whose official status in the Government appears above. Both these gentlemen had many years of varied, extensive experience in the arid and semiarid areas of the southwestern states. As bearer of the King's request, and because of my knowledge of Saudi Arabia, I was made chief of the mission.

Leaving Washington airfield on March 19, 1942, the mission traveled in the company of Admiral Standley, who was then proceeding to Moscow as American Ambassador to Russia; also of General Russell and Colonel Straum, who were going on special duty to India. The party landed at Cairo on the 26th.

Various matters delayed us in Egypt and it was not until May 9 that we left Cairo by plane. The party consisted of Mr. Alexander Kirk, United States Minister to Egypt and Saudi Arabia; his private secretary, Mr. Horne, and the Second Secretary of the Legation, Ray Hare; Colonel W. H. Crom of the U.S. Air Force; Major Towers, military attaché, Lieutenant Gerard, attaché of General Maxwell and representing him, and the Saudi Arab counselor of their legation at Cairo, Dr. Zerekle.

This was a unique occasion, for Mr. Kirk was to establish the first American Legation in Saudi Arabia. Appointed as Chargé d'Affaires, James S. Moose, Jr., was to organize the legation quarters and personnel at Jidda. He was promoted to the status of American Minister late in 1943. His tact, personality and experience in Iran well qualified him for this position. The two other members of the U.S. Agricultural

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Mission had proceeded by sea to Jidda. They, with Mr. Moose and his secretary and our secretary-interpreter, Ahmad Fakhri, met us at the Najd airport where ibn-Saud had established his huge camp—a young city of tents.

The airborne party reached Bahrain in the early afternoon. We were guests of the Bahrain Petroleum Company for the night at Awali. The General Manager, Ward Anderson, was the host. He, with Floyd Oligher, General Manager of the Arabian American Oil Company in Saudi Arabia, with his assistant, Roy Liebkicker, met and conveyed us to the oil camp. All the quarters were air-conditioned and furnished with American comforts and conveniences. The distance from Cairo by this route was 1,417 miles, taking eight hours, twenty-eight minutes flying time.

The next day all the party donned Arab costumes and with the addition of Mr. Oligher and their chief geologist, Max Steinike, took off after lunch and landed at the camp of King Abdul Aziz ibn-Saud, 45 miles south of the famous watering place, Bir Ruma. The navigation by Mr. Steinike was perfect.

The oil company engineers, Bert Perry and Merle Holbard, had done well to make a landing field for such a large plane in a stone and brush strewn wadi. They had a radio to keep contact with Bahrain and with the plane. Some of the King's soldiers asked what was in "the box"—the radio—and the engineers explained that the box had a voice which told them that a great bird would arrive there in twenty-five minutes, bringing guests from America to see Abdul Aziz. The plane duly arrived and about twenty men got out of it. The engineers at the radio turned to a Najdi soldier who had been curious and said, "What do you think of it?" He expressed awe and wonder both at what the box said and at what the "bird" had brought. However, the devout Moslem

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accepts everything as subject to the will of Allah and seldom is surprised, so he added critically, "The box was incorrect, for the bird arrived in twenty minutes, not twenty-five minutes, as it said!"

At the landing ground was a guard of honor. The Minister of Finance, Shaikh Abdullah Sulaiman Al Hamdan, welcomed Mr. Kirk and the party, and the captain and crew of the plane, on behalf of His Majesty. Tents were assigned to all, and after a meeting with our Jidda friends, arranging our baggage and washing, we had an informal audience with the King. With him were the Crown Prince Amir Saud, his brother the Viceroy of Hijaz, Amir Faisal, and four of his counselors, Basheer Magrubby, Mohammed Goths, Rushdi Bey and Khalid Bey Gargoni.

On May 11, 1942, Alexander Kirk formally presented his credentials as American Minister to the sovereign state of Saudi Arabia. Shortly afterward he introduced the U.S. Agricultural Mission. The audiences took place in front of the great tent, in a square, about 75 feet to a side, covered with Persian rugs. Overstuffed chairs made in Egypt were lined up on three sides. All the American party sat at the King's right, the princes sat with their father, to their left were the Saudi ministers. As His Majesty expressed his pleasure in greeting the new American Minister and his friends, the ceremony of taking coffee was under way. Two tall Najdi soldiers, one in a brilliant scarlet robe and the other in deep vivid blue, with shoulder belts, automatic pistols and cartridge magazines, plus a black *iqal* (head-rope) holding their *gutras* (head shawl), made an unforgettable picture. One poured about three-quarters of an inch of the Najd cardoman spiced coffee into each small cup from the Najd type of brass coffee pot or *della*, the other followed at an interval collecting the empty cups. An in-

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cense burner was then passed to each guest as a sign that the audience was over.

All his guests were charmed by the hospitality and cordiality of the King, and the extraordinary scene left indelible impressions on all the Americans. Ibn-Saud asked Mr. Kirk if he would like to visit his capital and home, and a three-hour trip by car took us on May 12 to Riyadh. The American party occupied a part of the palace of Crown Prince Saud at Badia. Amir Saud gave us an enjoyable lunch of European dishes. Afterwards we saw sound films given him by the British Legation, including views of President Roosevelt and Prime Minister Churchill meeting on the Atlantic and the return of the latter home via Iceland on H.M.S. "Prince of Wales." The sound track was all in Arabic.

The next day we enjoyed a banquet at Maruba Palace with King Abdul Aziz. He sat at the head of a great table towering above the thirty-two guests. In contrast to the European lunch given by Amir Saud, this was a Najdi feast. There were eight great platters along the center line of the table, and on each was a foundation of rice interspersed with raisins, on which rested a whole sheep. Flanking these platters were dishes of chickens, meats and vegetables.

The next day Mr. Kirk with his party returned to Cairo by plane. Mr. Moose went to Dhahran, the Saudi oil town, by car. We of the Agricultural Mission proceeded to al-Kharj—54 miles south of Riyadh. Here is the great reclamation project initiated by the Finance Minister, the nucleus of the present agricultural interest and development. The oil company has assisted by loaning its engineers and other staff members as advisers and to lay out some of the irrigation system, and the mining company has advised and purchased considerable equipment on behalf of the Finance Minister. Much of the fresh fruit and fresh vegetable supply for Riyadh

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is being produced here. The King is intensely interested in this project and greatly appreciated the sending of the Agricultural Mission.

Another mission was sent under General Royce in 1943, followed during the same year by the distinguished envoy, Lieutenant Colonel Hoskins. Early in 1944 still another man of intimate experience in the Near East and great practical tact and knowledge, Colonel William Eddy, was sent by the American Government to further the already friendly relations with ibn-Saud.

During 1944-1945 British and American military missions were sent to conduct training schools for Saudi Arab officers. The Americans, under Colonel Shomber, were most successful in teaching military surveying and the operation of machine guns and motor transport. The British specialized in light armored cars.

IMPORTS AND EXPORTS

Saudi Arabia is an importing country. It has not raised nearly sufficient foodstuffs to supply its inhabitants, and since the chief wealth has been in livestock—camels, sheep, goats and horses—there has been almost no manufacturing.

Revenues from the pilgrimages have provided the finances for imports up to the development of the mineral resources. The royalties on these have now helped the finances of the Government materially. From the spring of 1943 to the end of August 1945 the Lend-Lease program was extended to Saudi Arabia, and the British Government made huge loans to aid in the purchase of food supplies. The Middle East Supply Center was the medium for providing many of the supplies, as well as all the shipping facilities, from early 1942. Imports of manufactured articles will increase in the

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immediate future, while the amount of food items should decrease with the current development of agriculture.

The principal imports consist of rice, wheat, flour, barley, sugar, dates, coffee, tea, canned vegetables and fruits, cotton piece goods and other clothing materials, motor cars and trucks, and a very few tractors; a small amount of cooking utensils, furniture, carpenters' and other tools and implements are also imported.

At present the importance of exports is enormously increased. The development of commercial quantities of oil in the province of Hasa has created an export of great value. The Government receives 4/-gold per ton of all oil exported. The sums already received are considerable and the future is promising for a very large increase as other oil fields are brought into production. Another export, which commenced only in June 1939, is the concentrates and precipitates from the one mine on the western side of the country. These consist of gold, silver, and copper, of whose value the Saudi Government receives 5 per cent. As has been explained, the product is shipped to New Jersey for separation. It is possible that this source of revenue may be increased considerably, although it is not nearly as great in value as the potential revenue from oil royalties.

AGRICULTURE

It is to be emphasized that the present agricultural development stems entirely from the initiative of the Minister of Finance, Shaikh Abdullah Sulaiman, although naturally King ibn-Saud had to approve the proposals, as nothing of importance can be done without royal sanction.

The Finance Minister had two agricultural engineers from Iraq plan and execute the initial reclamation. One, Hasan Effendi, was still in charge under Shaikh Sulaiman

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Al Hamad—nephew of Shaikh Abdullah—when we of the U.S. Agricultural Mission visited Kharj in May 1942. The oil company engineers and geologists, Dr. R. A. Brancamp, T. C. Barger and L. M. Snyder, made the water investigations and helped in much of the general planning while their field engineers, Brown, Perry and Holbard, made the land and ditch surveys, directed construction and other technical work.

After our mission returned to Washington the State Department sent a most efficient and able group of practical agriculturists loaned by the U.S. Department of Agriculture under the leadership of Mr. David Rogers. They have directed an immense amount of construction along lines of the most approved American practice. This work includes ditching for drainage as well as for irrigation, and the introduction of the best methods of planting various crops including dates.

It is hoped that this whole Kharj-Khafs Daghra project will eventually become the center of an efficient Department of Agriculture and serve as a working example to teach the most modern practices to landowners and farmers from all parts of the kingdom.

There are two important projects in Hasa which can be undertaken as soon as the Saudi Government desires, which would increase the productive area of the Hofuf oasis by nearly 50 per cent. Of course, the necessary surveys and topographical maps on which to base the layout and the irrigation—including drainage systems—should be made first. These projects consist of 5,000 acres in the Asfar district on the eastern side of the oasis and just north from the Hofuf-Oqair road and the adjoining village of Jishsha; and the Ayuna and Ayuna Jenubia area, at present estimated at 5,000 acres. However, there are in addition areas in the Ayuna and

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Jenubia district totaling 2,000 to 5,000 acres, lying in irregularly shaped tracts distributed among and around the date groves.

The present drainage water from the groves would be sufficient to irrigate these lands during the months of December through February. A development of an additional water supply would be required for operating during the entire year. The development by the Government of a flowing artesian well at the western side of the oasis indicates that such supplemental irrigation water will not be difficult. This strike was made late in 1942, according to reports.

The soil is well suited for the raising of wheat; also much of it for rice, should there be sufficient water. Most of the ground surfaces in the above areas would require comparative little leveling. This project is a large and unusual asset. It could be productive after one season or more, depending upon the amount of equipment used and labor exerted. The yield per acre should be high, as the soil is virgin and of an excellent quality of sandy clay loam at Asfar, and good for wheat and rice in the Ayuna district. Here rice can be raised during the winter and other crops during the summer months. The soil is largely of shallow sandy loam underlain with impervious marl clay of varying depths. Here also there is evidence from ancient filled wells and water tunnels that formerly there was a more extensive civilization. The Ain Najm spring and garden of Shaikh Abdullah Sulaiman is one of these. When I first saw it in 1931 the spring was being excavated and walls repaired but the present garden was entirely covered with sand. On the way to Ayuna Jenubia "homesteading" is progressing through bringing to life another ancient spring.

Incidentally, efficient archeological work in Hasa might throw light on a great deal of hitherto unknown history.

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Another place of ancient history, present impoverishment and future possibilities is the oasis of Jabrin. This lies 161 miles south from Hofuf at an average elevation of 720 feet. The area is estimated at 7,500 acres. It was reported that 400 families of the Murra tribes lived here only when the dates were to be pollinated in the spring and harvested in the fall; the rest of the year was spent in the adjoining desert grazing the herds of camels, sheep and goats. Their only crop was dates. The quality was poor in most cases, as the palms are planted so closely together that they now form clumps, and their offshoots are not removed to enable a better growth of the parent tree. When better methods for care of the dates, as well as possibilities for raising vegetables, were suggested, the reply was that they, the Murra tribes, were not farmers and did not wish to become farmers. Therefore it is evident that no increase or progress in agriculture can be expected from the present inhabitants. By a well-supervised filling of the countless water pools in the oasis, the now prevalent malaria could be eliminated. It might then be possible to establish a settlement of *Ikhwan* who would follow efficient agricultural methods. A former *Ikhwan* settlement failed because of numerous deaths from malaria.

The most important agricultural area along the Persian Gulf extends from al-Khobar to Qatif, and Sofwa, almost adjoining to the west. Of these the largest is the Qatif section, of an estimated 9,000 acres. Conditions are similar to those at Hofuf, except that the soil, being a sandy loam grading down to sand, is more porous and not so fertile. There are similar large springs furnishing irrigation water, but the drainage ditches should be deeper and the usual irrigation intervals increased by three to five days, lasting, that is, seven to twelve days in all. This would improve the quality of the dates and the growth as well as the production of all the fruit trees, the

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alfalfa and melons. As in most of the arable lands fertility here would be improved by growing and plowing under green manure crops, such as cowpeas, soy beans, sisibanya, clovers and alfalfa. Only actual tests will show which is, or are, the best types adapted for each region. Vegetables are being grown for the oil company at Dhahran Camp in a leased plot in Qatif where excellent results have been obtained.

At the Sofwa oasis a mile or so to the west of Qatif there are identical conditions. The flow of the largest spring, Ain Darush, was estimated by A. L. Wathen at 9,000 gallons per minute or 20 cubic feet per second. Much of the drainage from this oasis runs into the Persian Gulf.

Although the *khillas* and other Hofuf dates are considered superior, those of Qatif and Sofwa are of good quality, many being shipped to Najd. Besides dates, bananas, papayas, pomegranates, mulberries, limes, grapes, alfalfa, sisibanya and peppers are grown.

On Tarut Island a mile offshore from Qatif there are again similar conditions of fair soil, large springs and date groves. The same remarks regarding improvements by adequate drainage and green fertilizer are applicable here.

At a district called Ajam, lying 20 miles north from the oil village of Dhahran and west of Sofwa, there are large areas of good soil, some of it extremely rich, but swampy in places, watered by springs. Some are of unknown age but the moil marks of the ancients who cut down through the limestone in some of the mouths of the springs can still be seen. By adequate pumps and draining a valuable productive area could be reclaimed which might provide the staff and employees of the oil company with many fresh vegetables and fruits. It is being studied and investigated by the company.

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Considerable benefit might be derived in gardens throughout the country by drying all surplus fruits and vegetables. They then last indefinitely and the cost of shipping them as compared to that of the fresh article is but a fraction. As the nomads live largely on dates and rice they might welcome these additions to their diet. It is a matter which should be considered and investigated. J. G. Hamilton thought that this and a great increase in the culture of honey bees might aid food production and general health conditions, thereby increasing the country's prosperity.

FUTURE OUTLOOK

Never in its history has the outlook for Saudi Arabia been as promising. Eventually oil, and to a certain extent other minerals also, should bring in a large regular revenue annually. Agricultural, educational and cultural progress will be aided by the managements of the several concessions.

The prospects for Saudi Arabia have become even more favorable lately as both American and British interests have indicated their desire to aid in various public works and private projects. One American group directed by Marcel E. Wagner, who has asked me to act as his consultant, has proposed to King Abdul Aziz ibn-Saud a program to be carried out for, and largely in partnership with, the Saudi Arabian Government and its nationals. This, if successful, will contribute substantially to the welfare and prosperity of the country. Another most important factor has materialized during the first week of 1946. This is a loan to the Saudi Arabian Government by the American Export-Import Bank of the sum of \$10,000,000. Besides this amount \$5,000,000 may be obtained in a second loan and allocated for developments such as public works and reclamation projects. Both Jidda vicinity and Riyadh need electric light and power as

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well as water systems. Now it is probable that these will eventuate.

The present American minister, Mr. Childs, as well as Colonel Eddy, is both competent and eager to promote the prosperity of Saudi Arabia and collaboration between it and the United States. And, for the record, it must ever be remembered that it was the oil and mining enterprises which induced official American representation and that diplomatic influence did not come first.

Glossary of Arabic Place-Names

Abqaiq (Abqayq)	Buraida (Buraydah)
Aflaj (al-Aflāj)	
Ain ('Ayn)	Dabba (Ḍuba)
Ainain ('Aynayn)	Dafina (Dafinah)
Ain al-Heet ('Ayn al-Hit)	Dahna (al-Dahnā')
Ais ('Ays)	Dammam (al-Dammām)
Ajam (al-'Ajam)	Darain (al-Dārayn)
Ajman (al-'Ijmān)	al-Darr (al-Dharr)
Alemat ('Alāmāt)	Darush (Darūsh)
Amk ('Imq)	Dhahaban (Dhahabān)
Anaiza ('Unayzah)	Dhahran (Ḍahrān)
Aqaba (al-'Aqabah)	Dhāt al-Okdood
Aqiq ('Aqīq)	(Dhāt al-Ukhdūd)
Arid (al-'Āriḍ)	Dhila (al-Dhila')
Arish (al-'Arish)	Duwadami (Duwādami)
Artawiyah (al-Artāwīyah)	
Asfar (Aṣfar)	Faid (Fayd)
Ashaira ('Ashayrah)	Farasan (Farasān)
Asir ('Asir)	Fawara (al-Fawwārah)
Ataiba ('Utaybah)	
Atiya ('Aṭīyah)	Hadda (al-Ḥaddah)
Awamia (al-'Awwamīyah)	Hadriya (al-Ḥadriyah)
Awanid (Awaynīd)	Hafira (al-Ḥafirah)
Awazim (al-'Awāzim)	Hail (Ḥā'il)
	Hajir (Hājir)
Badia (al-Bādiyah)	Hakl (al-Ḥaql)
Bahrain (al-Baḥrayn)	Harb (Ḥarb)
Baish (Baysh)	Hariq (al-Ḥāriq)
Bir (Bir)	Hasa (al-Ḥasā')
Birka (al-Birkah)	Hauta (al-Ḥūṭah)
Bisha (Bishah)	Hazazina (al-Hazāzinah)

GLOSSARY

Hijaz (al-Hijāz)	Maan (Ma'ān)
Hinnot (Hinnu)	Mahad Dhahab
Hodeida (al-Ḥudaydah)	(Mahd al-Dhahab)
Hofuf (al-Hufūf)	Majmaa (al-Majma'ah)
Howiya (al-Huway'ah)	Marrat (Marrāt)
Hummaya (al-Humīyah)	Medain Saleh
Husainiya (al-Ḥusayniyah)	(Madā'in Šālīḥ)
Huwaitat (al-Ḥuwaytāt)	Muwailah (al-Muwayliḥ)
Jabrin (Jabrīn)	Nafud (al-Nufūd)
Jash (al-Jashsh)	Oglat al-Sughour
Jauf (al-Jawf)	('Uglat al-Šugūr)
Jidda (Juddah)	Oman ('Umān)
Jizan (Jizān)	Oqair ('Uqayr)
Joraina (Juraynah)	Qahtan (Qaḥṭān)
Jubail (Jubayl)	Qaiaya (al-Qay'iyyah)
Jubaila (Jubaylah)	Qalat al-Sura
Khafs Dagħara	(Qal'at al-Sūrah)
(Khafs al-Dagħārah)	Qasim (al-Qašīm)
Khaibar (Khaybar)	Qatar (Qaṭar)
Khamaseen (al-Khammasīn)	Qatif (al-Qaṭīf)
Khamis Mushait	Rabigh (Rābigh)
(Khamīs Mushayṭ)	Raoum (Ra' ūm)
Kharj (al-Kharj)	Rass (al-Rass)
Khobar (al-Khūbar)	Ras Tanura
Khor al-Birk (Khūr al-Birk)	(Rās al-Tannūrah)
Khurma (Khurmah)	Riyadh (al-Riyāḍ)
Kunfida (al-Qunfidah)	Ruma (Rumāh)
Kuwait (al-Kuwayt)	Sabya (Šabya)
Lith (al-Lith)	
Maagala (Umm 'Uqlah)	

GLOSSARY

Sakaka (Sakākah)	Tihamah (Tihāmah)
Sanaa (Şan‘ā’)	Tuwaik (Tuwayq)
Shab al-Jaleed (Shi ‘b al-Jalīd)	al-Ula (al-‘Ula)
Shuqaiq (al-Shuqayq)	Uwainid (‘Uwaynid)
Sofwa (Şafwah)	
Subai (Subay‘)	Wadi Dawasir (al-Dawāsir)
Sud al-Jamajim (Sudd al-Jamajīm)	Wadi Hamdh (al-Ḥamd)
Sud Sayaud (Sudd Suyūd)	Wadi Rumma (al-Rummah)
Sud Somalagi (Sudd al-Samlaqi)	Wadi Tathlith (Tathlith)
Suhul (al-Suhūl)	Wadi Uqda (‘Uqdah)
Suk ibn-Mushait (Sūq ibn-Mushayṭ)	Wadi Yenbo (Yanbu‘)
Sulaiyil (al-Sulayyil)	Waziria (al-Wazīriyah)
	Wejh (al-Wijh)
Taif (al-Ṭā’if)	Yamama (al-Yamāmah)
Taima (Taymā’)	Yaman (al-Yaman)
Tarut (Tārūt)	Yenbo (Yanbu‘)
Thamama (Thamāmah)	Yenbo Nakhl (Yanbu‘ al-Nakhl)

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